TOSHIBA

Leading Innovation

UNINTERRUPTIBLE POWER SYSTEM (UPS)

1600XP/1600XPi SERIES

INSTALLATION AND OPERATION MANUAL

SINGLE PHASE - 3.6/6/8/10/14/18/22 KVA

1600XPi

1600XP

Part # 60616-0010
October 2014

Manufactured in the USA

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The instructions contained in this manual are not intended to cover all of the details or variations in equipment, or to provide for every possible contingency concerning installation, operation, or maintenance. Should further information be required or if problems arise which are not covered sufficiently, contact your Toshiba sales office.

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Any electrical or mechanical modifications to this equipment without prior written consent of Toshiba International Corporation will void all warranties and may void the UL/CUL listing. Unauthorized modifications can also result in personal injury, loss of life, or destruction of the equipment.

QUALIFIED PERSONNEL ONLY

Qualified Personnel are those who have the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and have received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

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UNINTERRUPTIBLE POWER SYSTEM (UPS)

Please complete the following information and retain for your records.

Unless otherwise specified, the warranty period for the UPS or UPS part is 36 months from the shipment date (see Toshiba International Corporation bill of lading).

Unless otherwise specified, the warranty period for a UPS battery is 24 months from the shipment date (see Toshiba International Corporation bill of lading).

JOB NUMBER _____

MODEL NUMBER _____

SERIAL NUMBER _____

APPLICATION _____

SHIPMENT DATE _____

INSTALLATION DATE _____

INSPECTED BY _____

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Purpose

This manual provides information on how to safely install your Toshiba International Corporation power electronics product. This manual includes a section of general safety instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English customary equivalent.

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Toshiba Customer Support Center

Contact the Toshiba Customer Support Center for assistance with application information or for any problems that you may experience with your Uninterruptible Power System (UPS).

Toshiba Customer Support Center
8 a.m. to 5 p.m. (CST) – Monday through Friday
USA Toll Free (877) 867-8773 – Field Service Tech Support
USA Toll Free (855) 803-7087 – Pre-sales Application Support
Fax (713) 896-5212

You may also contact Toshiba by writing to:

Toshiba International Corporation
13131 West Little York Road
Houston, Texas 77041-9990
Attn: 1600XP/1600XPi Product Manager

For further information on Toshiba products and services, please visit our website.

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1. General Safety Instructions

DO NOT attempt to transport, install, operate, maintain or dispose of this equipment until you have read and understood all of the product safety information provided in this manual.

1.1 Symbols

The symbols listed below are used throughout this manual. When symbols are used in this manual they will include important safety information that must be carefully followed.

Safety Alert Symbol indicates that a potential personal injury hazard exists.

Prohibited Symbol indicates **DO NOT** take action.

Mandatory Symbol indicates that the following instruction is required.

Ground Symbol indicates the location of the equipment grounding conductor.

Electrical – Voltage & Shock Hazard Symbol indicates parts inside may cause electric shock.

Explosion Hazard Symbol indicates parts may explode.

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1.2 Signal Words

The signal words listed below are used throughout this manual. When the words DANGER, WARNING, CAUTION and NOTICE are used in this manual they will include important safety information that must be carefully followed.

The word **DANGER** in capital letters preceded by the safety alert symbol indicates that an **imminently hazardous** situation exists, and if not avoided **will result in loss of life or serious injury to personnel.**

The word **WARNING** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in loss of life or serious injury to personnel.**

The word **CAUTION** in capital letters preceded by the safety alert symbol indicates that a **potentially hazardous** situation exists, and if not avoided **may result in minor or moderate injury.**

The word **NOTICE** in capital letters without the safety alert symbol indicates a **potentially hazardous** situation exists, and if not avoided **may result in equipment and property damage.**

1.3 Regulatory Compliance Statement

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Notice: The FCC regulations provide that changes or modifications made to this device that are not approved by Toshiba International Corporation may void the authority granted to the user by the FCC to operate this equipment.

EMC Directive Class A Note

This UPS is commercial in design and not intended for use at anytime in a Residential Environment.

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2. Equipment Warning Labels

The following pages show examples of warning labels that may be attached to either the interior or exterior of the UPS. Do not remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your equipment representative for additional labels.

These labels are placed to provide useful information or to indicate an imminently hazardous situation that may result in severe equipment/property damage, serious injury, or loss of life if instructions are not followed.

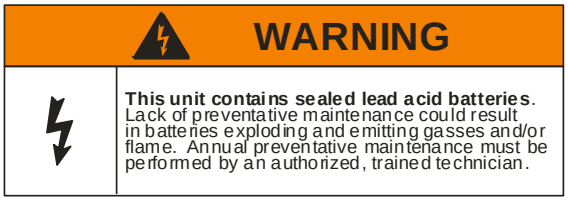
DANGER
Risk of injury, electric shock or fire.
Read the instruction manual.
No user serviceable parts inside.
Refer service to qualified service personnel.
Do not open the cover while power is applied or within 5 minutes after removal of power.
High leakage current.
Earth connection essential before connecting supply.
63094

P/N 63094 – External warning sign.

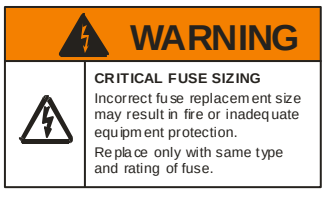
- Unit contains potentially dangerous voltages.
- Read the instruction manual before operating.
- There are no user serviceable parts inside. Refer service to qualified personnel.
- Do not open the cover while power is applied, or within five minutes after removal of power.
- Potentially hazardous leakage current may exist. Ensure the grounding is connected before connecting the utility power.

DANGER/ATTENTION
Risk of electrical shock. Do not touch uninsulated battery terminals. Batteries should be serviced by qualified service representative only. Miswiring of battery could result in electrcal shock and/or fire.
Risque de choc electrique. Le circuit des batteries nest pas esolede secteur. Les cosses des batteries peuvent presenter une tension dangereuse part rapport a la terre. Verifier avant de toucher.

P/N 48518 – Battery terminals can deliver dangerous electrical shock. Service by qualified service representatives only.


WARNING
This unit contains sealed lead acid batteries. Lack of preventative maintenance could result in batteries exploding and emitting gasses and/or flame. Annual preventative maintenance must be performed by an authorized, trained technician.

P/N 49455 – UPS Batteries require annual preventative maintenance. Failure to perform regular maintenance could result in batteries exploding, or emitting gasses or flame.


WARNING
CRITICAL FUSE SIZING
Incorrect fuse replacement size may result in fire or inadequate equipment protection.
Replace only with same type and rating of fuse.

P/N 49455 – Replace Fuse only with one of same type and range. Incorrect fuse size may result in equipment damage.

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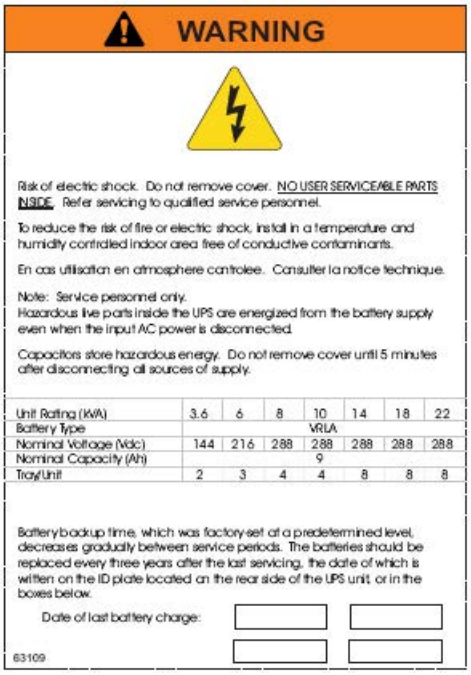
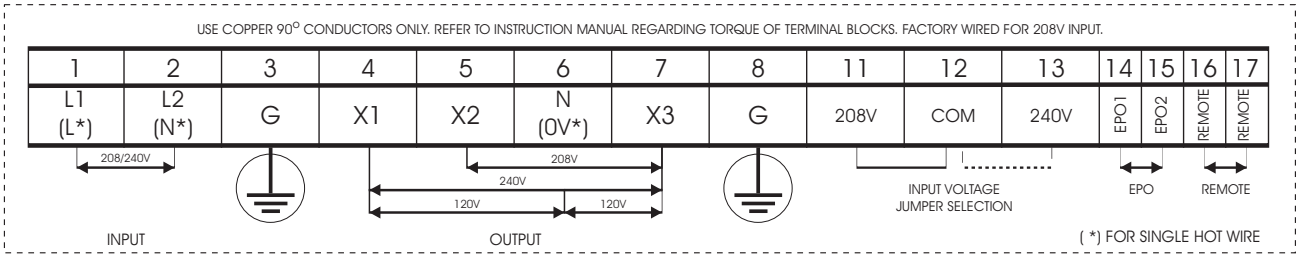
Battery Cabinet Warning Label.
* For reference only, DC voltage varies by kVA size of the UPS.


WARNING
Risk of electric shock. Do not remove cover. NO USER SERVICEABLE PARTS INSIDE. Refer servicing to qualified service personnel.
To reduce the risk of fire or electric shock, install in a temperature and humidity controlled indoor area free of conductive contaminants.
En cas utilisation en atmosphere controlee. Consulter la notice technique.
Note: Service personnel only.
Hazardous live parts inside the UPS are energized from the battery supply even when the input AC power is disconnected.
Capacitors store hazardous energy. Do not remove cover until 5 minutes after disconnecting all sources of supply.
Unit Rating (kVA) 3.6 6 8 10 14 18 22
Battery Type VRLA
Nominal Voltage (Vdc) 144 216 288 288 288 288 288
Nominal Capacity (Ah) 9
Tray/Unit 2 3 4 4 8 8 8
Battery backup time, which was factory-set at a predetermined level, decreases gradually between service periods. The batteries should be replaced every three years after the last servicing, the date of which is written on the ID plate located on the rear side of the UPS unit, or in the boxes below.
Date of last battery charge:
63109

P/N 63109 – There are no user-serviceable parts behind cover. Wait five minutes after disconnecting the UPS to allow the internal capacitors to discharge completely.

Date of last recorded battery change.


USE COPPER 90° CONDUCTORS ONLY. REFER TO INSTRUCTION MANUAL REGARDING TORQUE OF TERMINAL BLOCKS. FACTORY WIRED FOR 208V INPUT.
1 2 3 4 5 6 7 8 11 12 13 14 15 16 17
L1 (L*) L2 (N*) G X1 X2 N (0V*) X3 G 208V COM 240V EPO1 EPO2 REMOTE REMOTE
208/240V
208V
240V
120V 120V
INPUT VOLTAGE JUMPER SELECTION
EPO
REMOTE
INPUT
OUTPUT
(*) FOR SINGLE HOT WIRE

P/N63093 - Power Terminal Label

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3. Important Safety Instructions

This manual contains important instructions that should be followed during the installation and maintenance of the UPS and its batteries.

Hardwired UPS units are not equipped with an over-current protection device nor an output disconnect for the AC output. Circuit breakers should be provided by the user between the UPS Input and utility power, and the UPS output and the load input. These devices should be rated as follows:

240VAC RATING	3.6 kVA	6 kVA	8 kVA	10 kVA	14 kVA	18 kVA	22 kVA
Input Breaker	30 A	50 A	60 A	70 A	100 A	100 A	125 A
Output Breaker	20 A	35 A	45 A	60 A	80 A	100 A	125 A

* Ratings are for an 80% rated device.

The nominal battery voltages for these models are as follows:

BATTERY VOLTAGE	3.6 kVA	6 kVA	8 kVA	10 kVA	14 kVA	18 kVA	22 kVA
	144 Vdc	216 Vdc	288 Vdc	288 Vdc	288 Vdc	288 Vdc	288 Vdc

Servicing of the batteries should only be performed by a qualified factory authorized representative who is knowledgeable about batteries and the required precautions. Keep unauthorized personnel away from batteries. To arrange for battery replacement, contact Toshiba Customer Support Center.

1. Turn off, lockout, and tagout all equipment before connecting the power wiring to the equipment or when performing maintenance.
2. The maximum ambient operating temperature is 104 °F (40 °C).
3. Access panels should only be removed by authorized Toshiba field Service personnel.
4. UPS servicing should be performed by qualified Toshiba representatives only.
5. Battery servicing should be performed by qualified Toshiba representatives only.
6. Contact your Toshiba authorized service center for battery replacement.

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3.1 Qualified Personnel Only

Qualified personnel are those who have the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and have received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified personnel shall:

1. Have read the entire operation manual.
2. Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
3. Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
4. Be trained in rendering first aid.
5. Be knowledgeable about batteries and their required handling and maintenance precautions.

For further information about workplace safety visit www.osha.gov.

⚠ CAUTION

Misuse of this equipment may result in human injury and equipment damage. In no event will Toshiba Corporation be responsible or liable for either indirect or consequential damage or injury that may result from the misuse of this equipment.

⚠ CAUTION

DO NOT dispose of the battery module in a fire. The batteries inside may explode.

⚠ CAUTION

DO NOT open or mutilate the batteries. Released electrolyte is harmful to the eyes and skin and could also be toxic.

To be performed by **Qualified Personnel Only**:

1. Verify that the UPS is off and that the power is disconnected from the power source.
2. Remove watches, rings or other metal objects.
3. Use tools with insulated handles to prevent inadvertent shorts.
4. Wear rubber safety gloves and boots.
5. DO NOT place tools or any metal parts on top of batteries.
6. Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground.

⚠ WARNING	
	Contact with any part of a grounded battery can result in electrical shock. The likelihood of shock will be reduced if such grounds are removed prior to installation or maintenance.

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4. Inspection/Storage/Disposal

4.1 Inspection

Inspect for shipping damage upon receipt of the UPS. Use caution when removing the unit from the pallet. Refer to labels or documentation attached to packing material.

4.2 Unpacking

Check the unit for loose, broken, bent or otherwise damaged parts. If damage has occurred during shipping, keep all original crating and packing materials for return to the shipping agent. The warranty does not apply to damage incurred during shipping. Ensure that the rated capacity and the model number specified on the nameplate conform to the order specifications.

4.3 Storage

During periods of non-use, the following guidelines are recommended for storage.

Storage Preparation

1. Power up the UPS and allow it to operate with no load for 24 hours to fully charge the batteries.
2. Stop the unit (see Stop Operation on page 16).
3. Place the MCCB switch (see Appendix C for location) in the Off position.

Storing Conditions

- For best results, store the UPS in the original shipping container and place on a wood or metal pallet.
- Storage temperature: -4 – 104 °F (-20 – 40 °C).
- The optimum storage temperature is 70 °F (21 °C). A higher ambient temperature will require recharging more frequently during storage.

Avoid storage locations that:

- Are subject to extreme temperature changes or high humidity.
- Are subject to high levels of dust or metal particles.
- Are subject to excessive vibration.
- Have inclined floor surfaces.

Storage Maintenance

- If stored at an ambient temperature less than 68 °F (20 °C), recharge the batteries every 9 months.
- If stored at an ambient temperature of 68 – 86 °F (20 – 30 °C), recharge the batteries every 6 months.
- If stored at an ambient temperature of 86 – 104 °F (30 – 40 °C), recharge the batteries every 3 months.

4.4 Disposal

Contact your local or state environmental agency for details on disposal of electrical components and packaging in your particular area.

It is illegal to dump lead-acid batteries in landfills or dispose of improperly.

Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call Toshiba toll-free at (877) 867-8773 for more information about recycling.

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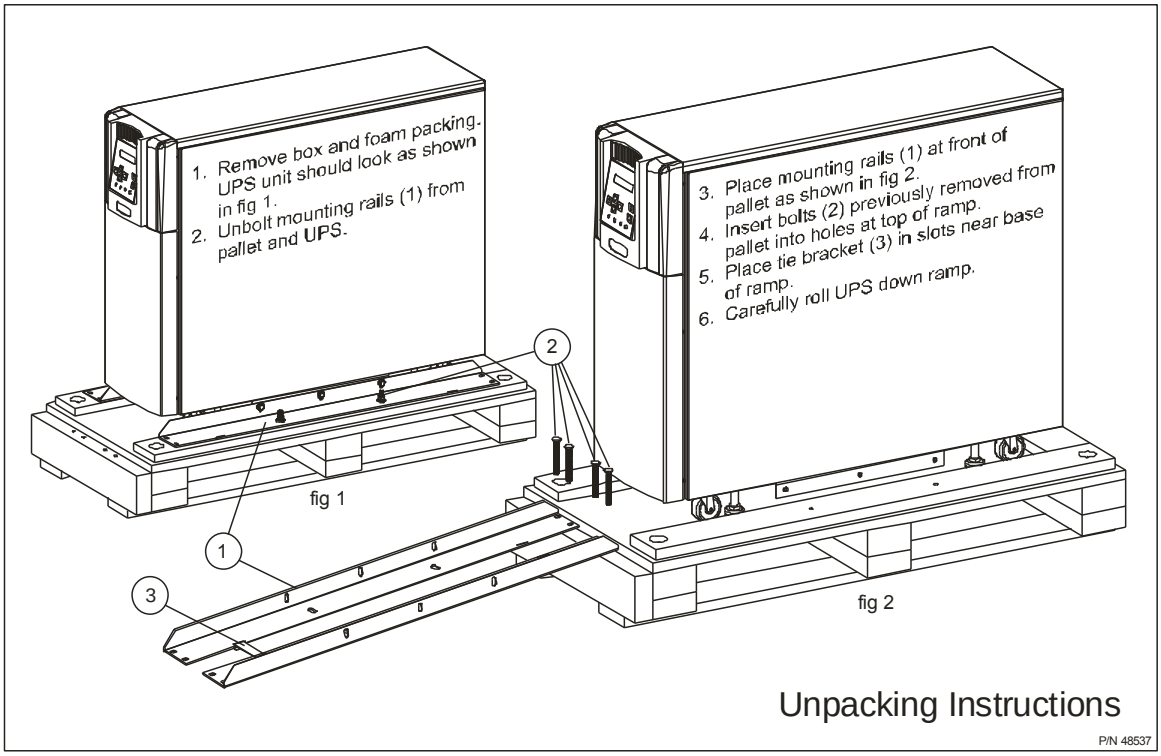
5. Installation Precautions

NOTICE

1. Observe the following environmental restrictions:
   - Install the unit in a well-ventilated location; allow at least 4 inches (10 cm) on all sides for air ventilation and for maintenance.
   - Install the unit where the ambient temperature is within the range specified in Appendix A - “Specifications”.
   - DO NOT install the UPS in areas that are subject to high humidity.
   - DO NOT install the UPS in areas that allow exposure to direct sunlight.
   - DO NOT install the UPS in areas that allow exposure to high levels of airborne dust, metal particles, or flammable gases.
   - DO NOT install the UPS in areas near sources of electrical noise. Ensuring a proper earth ground will reduce the effects of electrical noise and will reduce the potential for electrical shock.
   - DO NOT install the UPS in areas that would allow fluids or any foreign object to get inside the UPS.
2. UPS is intended for permanent installation only. Install the unit in a stable, level and upright position that is free of excessive vibration.
3. Follow the instructions on the unpacking label affixed to the exterior of the UPS.


1. Remove box and foam packing. UPS unit should look as shown in fig 1.
2. Unbolt mounting rails (1) from pallet and UPS.
fig 1
3. Place mounting rails (1) at front of pallet as shown in fig 2.
4. Insert bolts (2) previously removed from pallet into holes at top of ramp.
5. Place tie bracket (3) in slots near base of ramp.
6. Carefully roll UPS down ramp.
fig 2
1
2
3
Unpacking Instructions
P/N 48537

4. Retain the shipping rails for use as permanent mounting of the UPS.

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5. Once the installation is complete, use a 3/4 inch wrench to screw down the UPS leveling feet located next to the four casters, until the unit is no longer resting on the casters.
6. The UPS generates and can radiate radio-frequency energy during operation. Although RFI noise filters are installed inside of the unit, there is no guarantee that the UPS will not influence some sensitive devices that are operating near by. If such interference is experienced, the UPS should be installed farther away from the affected equipment and/or powered from a different source than that of the affected equipment.
7. It is the responsibility of the installer of this equipment to provide a suitable disconnect for the Control Panel supplying power to this equipment.

   This disconnect must:

   Be suitable for the Voltage and Full Load Ampere Rating of all downstream equipment supplied by the Panel;

   The supply disconnecting device shall be one of the following types:

   - Switch-disconnector, with or without fuses, in accordance with IEC 60947-3, utilization category AC-23B or DC-23B
   - As above, except one that has an auxiliary contact that in all cases causes switching devices to break the load circuit before the opening of the main contacts of the disconnector.
   - A circuit breaker suitable as an isolation device per IEC 60947-2
   - Any other switching device in accordance with an IEC product standard that also meets the isolation requirements of IEC 60947-1 and is appropriate for on-load switching of motors or other inductive loads;

   Be approved for use as a disconnect for the country in which this equipment is installed.

   Be provided with a Lock Out Tag Out capability in the Off (Down) position.

8. Allow 5 minutes after power is removed for internal capacitors to fully discharge before attempting to service the unit.
9. The user should provide output over-current protection for hardwired UPS systems. See Appendix A - “Specifications” for the device rating.
10. After ensuring that all power sources are turned off and isolated in accordance with established lockout/tagout procedures, connect the power source wiring of the correct voltage to the input terminals of the UPS.
11. The end user must supply suitable strain relief for the power cord and the cord must extend a distance of 1/2 diameter beyond the clamp.
12. Connect the output terminals of the UPS to the load in line with local wiring regulations. Size the branch circuit conductors in accordance with NEC Table 310.16.

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6. Conductor Routing and Grounding

1. Use separate metal conduits for routing the input power, output power, and control circuits.
2. Follow the wire size and tightening torque specifications listed in “” on page 13.
3. Always ground the unit to reduce the potential for electrical shock and to help reduce electrical noise.
4. A separate ground cable should be run inside the conduit with the input power, output power, and control circuits.

⚠ WARNING	
	THE METAL OF CONDUIT IS NOT AN ACCEPTABLE GROUND.

7. Operating Precautions

1. The UPS should not be powered up until the entire operation manual has been read.
2. The voltage of the input power source must be within the range of +10% to -30% of the rated input voltage. The input frequency must be within the rated input frequency range. Voltages and frequencies outside of the permissible range may activate the internal protection devices.
3. The UPS should not be used with a load that has a rated input that is greater than the rated output of the UPS.
4. DO NOT use the UPS to provide power to motors that require high starting current or with motors that require a long starting time, such as vacuum cleaners and machine tools (oversizing the UPS for lock rotor current would be required).
5. DO NOT insert metal objects or combustible materials in the ventilation slots of the UPS.
6. DO NOT place, hang, or paste any objects on the exterior surfaces of the UPS.
7. The capacitors of the UPS maintain a residual charge for a while after turning the UPS off.
8. DO NOT attempt to disassemble, modify, or repair the UPS. Repairs and servicing should only be performed by Toshiba Field Service personnel.
9. DO NOT remove any covers of the UPS when the power is on.
10. Turn the power on only after installing ALL of the covers.
11. If the UPS should emit smoke, produce an unusual odor, or make sound, turn the power off immediately.
12. Changing/replacing the UPS Batteries should only be performed by Toshiba field service personnel.
13. Warning signs should be placed on or near the load as a notification that the load is being powered by the UPS.
14. Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.

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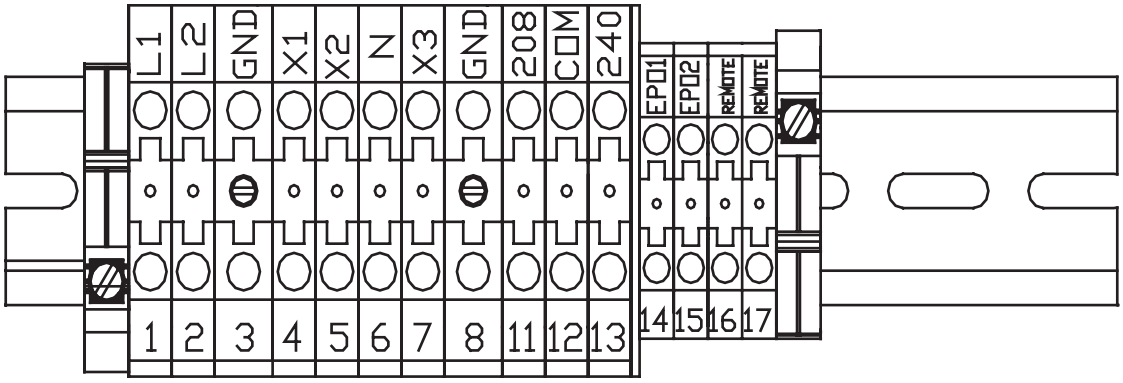
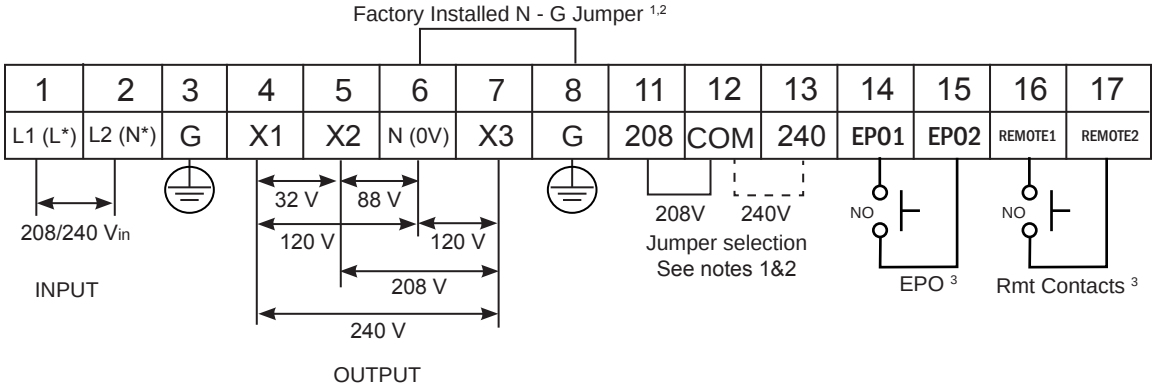
8. UPS Connections

8.1 Terminal Block

The following illustration is a detail view of the terminal block and wiring connections used for 208/240 volt units (see “Appendix C: 1600XP/1600XPi Dimensions and Weights” on page C1).





* – If only one input line is hot, connect hot line to terminal 1 (L), and connect the Neutral line to terminal 2 (N).

NOTE 1 – If AC input power is 208 Vac rated, short terminals 11 and 12 with a jumper wire. DO NOT jumper terminal 13 to 12 or 11. Factory Setting is 208 Vac. **Use the jumper wire provided by Toshiba. DO NOT add any additional jumpers.**

NOTE 2 – If AC input power is 240 Vac rated, short terminals 12 and 13 with a jumper wire. DO NOT jumper terminal 11 to 12 or 13. **Use the jumper wire provided by Toshiba. DO NOT add any additional jumpers.**

NOTE 3 – **EPO** and **Rmt Contacts** function – See Section 8.2

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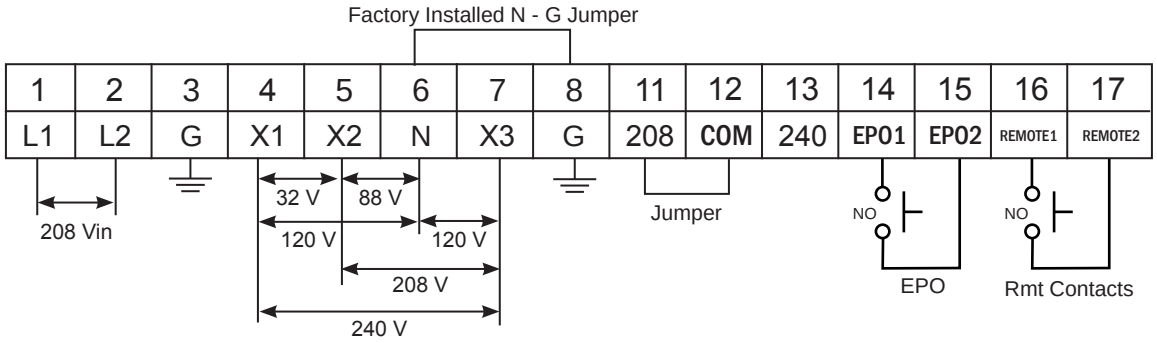
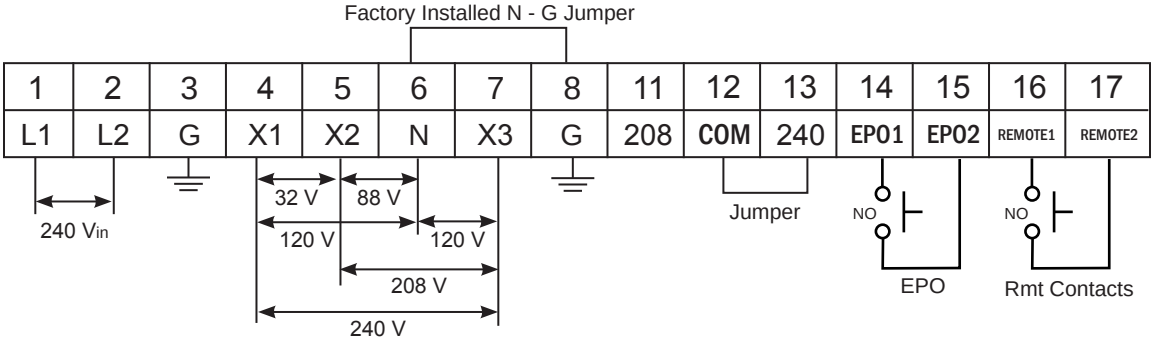
Input and Jumper wire/bus strip connection for:

208 Vin – Using provided jumper, connect terminals 11 – 12.

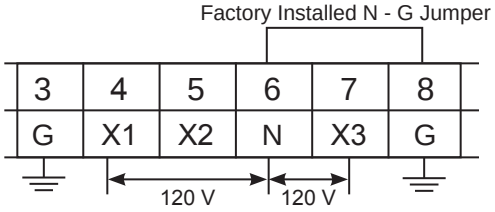


240 Vin – Using provided jumper, connect terminals 13 – 12.

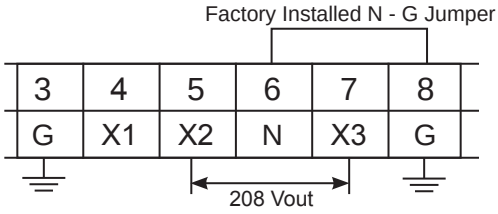


Output Cabling for:

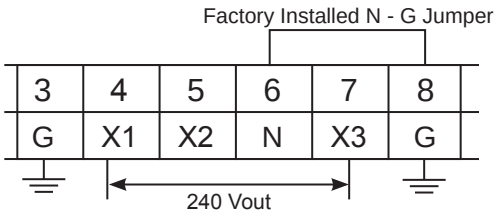
120 Vout
Connect load across Terminals 4 – 6 or 6 – 7.



208 Vout
Connect load across terminals 5 – 7.



240 Vout
Connect load across terminals 4 – 7.



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8.2 EPO and Remote Shutdown

EPO (Emergency Power Off): TB1-14, -15
The EPO is a NO (Normally Open) dry contact switch. When the EPO is closed, the Input circuit breaker to the UPS opens and all power to the unit is removed, including backup power from the batteries.

Remote Shutdown: TB1-16, -17
The Remote Shutdown is a NO (Normally Open) dry contact switch. When the Remote Shutdown switch is closed, the UPS transfers from Normal/Backup to Bypass after a 1 – 2 sec. detection delay. (See the diagram below)

When the closed Remote Shutdown switch is opened, the UPS transfers from Bypass back to it's initial state (Normal/Backup) after a 1 – 2 sec. detection delay.

If the UPS is in bypass when the Remote Shutdown is closed, no action is taken.

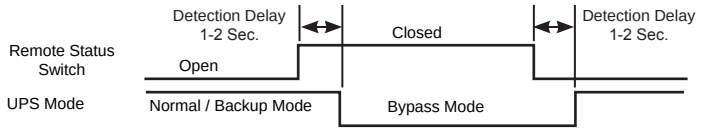

FIGURE 8.2-1 REMOTE STATUS SHUTDOWN TIMING

8.3 Cable Size and Tightening Torque

Use the following table to select the recommended wire size and terminal lug tightening torque for I/O wire connections. Use 90 °C copper conductors for all Input, Output, and Ground wiring.

Item	Terminal Number	Cable Size – AWG						Tightening Torque lb.-in. (N•m)
		3.6 kVA	6 kVA	8 kVA	10 kVA	14 – 18 kVA	22 kVA	
AC Input Lines	1 and 2	10 **(8)**	8 **(8)**	8 **(1/0)**	6 **(1/0)**	4 **(1/0)**	1 **(1/0)**	14.2 (1.56)
AC Output Lines	4, 5, and 7	12 **(8)**	10 **(8)**	8 **(1/0)**	6 **(1/0)**	4 **(1/0)**	1 **(1/0)**	14.2 (1.56)
AC Output Neutral	6	12 **(8)**	10 **(8)**	8 **(1/0)**	6 **(1/0)**	4 **(1/0))**	1 **(1/0)**	14.2 (1.56)
Ground	3 and 8	12 **(8)**	10 **(8)**	8 **(1/0)**	6 **(1/0)**	4 **(1/0))**	1 **(1/0)**	14.2 (1.56)
EPO Switch	14 and 15	16	16	16	16	16	16	9.0 (0.99)
Remote Switch	16 and 17	16	16	16	16	16	16	9.0 (0.99)

Note: Wire size is presented as the recommended size followed by a bold number in () indicating the maximum wire size the terminal block can accommodate. See Appendix C for knock-out hole sizes on the back of each model.

8.4 Battery Cabinet Connections

Optional external battery cabinets can be used to extend the backup time of the UPS beyond that available with the internal batteries. The external battery cabinets connect to the UPS via Anderson-style connectors. See Section 20.

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9. Product Description

An uninterruptible power system (UPS) is a system that is installed between the commercial power and the load equipment. The UPS provides steady AC output power during commercial power short-term blackouts or brownouts. This power is provided for a sufficient amount of time so that the load can be shut down in an orderly fashion. This prevents loss of data and possible damage to both hardware and software.

During normal operation, the UPS uses commercial AC power. It absorbs all of the high voltage spikes and transients caused by switching and faults, and all of the common-mode and normal mode noise which is associated with commercial AC power. The UPS converts it all to clean DC power. From this power, the UPS charges its batteries and generates its own extremely high quality AC waveform output. The result of this process is maximum power conditioning and regulation.

If the AC power supplied to the UPS drops below a specified voltage level, the unit's batteries automatically begin supplying power instead of receiving it. This insures that the loads connected to the UPS continue to receive power with no interruption. When AC input power becomes available again, operation returns to normal. The unit's batteries begin to recharge so they will be ready for the next power interruption.

9.1 Application and Use

Toshiba 1600XP/1600XPi Series of On-Line UPS provides continuous computer-grade AC power in a compact, high performance, and energy efficient unit. The UPS unit ensures safe and reliable operation of critical office equipment. All units feature an audible alarm which sounds if the battery voltage drops below a specified minimum during use. This is an additional aid to help protect valuable office data banks. All units allow for computer interfacing.

9.2 Output Rating

Toshiba 1600XP and 1600XPi Series (208/240V) offers UPS models with the following capacities:

MODEL	Output Capacity @ 240 V	Output kW @ .85PF 240 V
UH3G2L036C61T, H3BG2L036C61T	3.6 kVA	3.1 kW
UH3G2L060C61T, H3BG2L060C61T	6 kVA	5.1 kW
UH3G2L080C61T, H3BG2L080C61T	8 kVA	6.8 kW
UH3G2L100C61T, H3BG2L100C61T	10 kVA	8.5 kW
UH3G2L140C61T, H3BG2L140C61T	14 kVA	11.9 kW
UH3G2L180C61T, H3BG2L180C61T	18 kVA	15.3 kW
UH3G2L220C61T*, H3BG2L220C61T*	22 kVA*	18.7 kW*

All models are RoHS compliant with the batteries being exempt from the directive.
*NOTE: Derate to 18.7 kVA (15.9 kW) for 50 Hz operation.

9.3 Power Backup

When an electrical power failure occurs, the UPS's internal batteries automatically supply back-up power to the load without interruption. For example, when used to support a computer, the UPS back-up assures enough additional time to complete the activity and store the data. This allows an orderly shutdown after a power failure has occurred.

9.4 Power Conditioning

When commercial power is present, the UPS supplies conditioned power to the load while maintaining its batteries in a charged condition. The UPS protects against the normal, everyday problems associated with unreliable commercial power, including power sags, surges, signal interference, and spikes. This protection keeps power-line problems from reaching your load, where they can cause equipment to operate erratically, or damage software and hardware.

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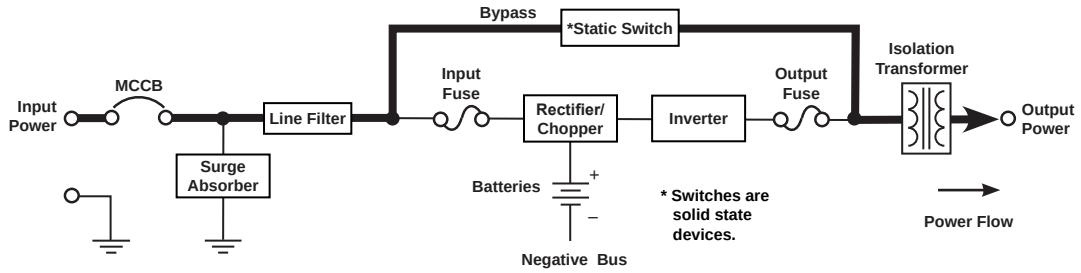
10. Operating Modes

10.1 Static-Bypass (Stop operation)

If the UPS unit is severely overloaded or develops an internal fault, power flow is automatically switched from the unit's main circuit to the bypass circuit. Power flow through the bypass is shown in the following illustration. This change-over occurs automatically in phase in less than one-quarter cycle of the input waveform. The switching period is not long enough to cause interruptions to occur in most loads.

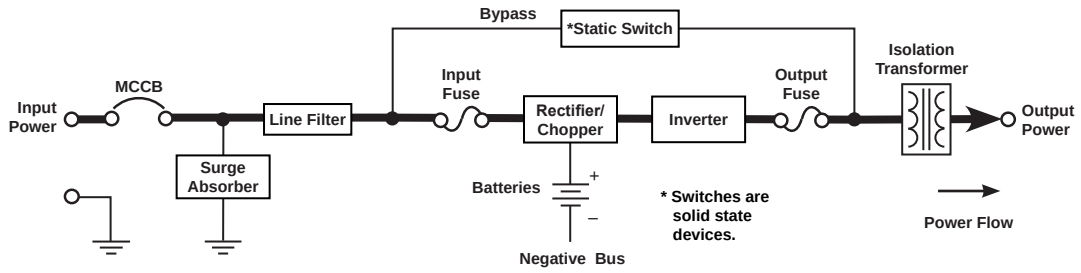
- If the power flow is transferred to the bypass circuit due to an internal fault the UPS will continue to supply power to the load through the bypass and indicate a system fault message (see "24.3 System Fault Messages" on page 52).
- If the power flow is transferred to the bypass circuit due to an overload condition (see "24.4 System Warning Messages" on page 53), then the power flow will automatically transfer from the UPS's bypass circuit back to the inverter circuit after removing the overload if set to do so (AutoXfer parameter (Cmd ID 660)).



POWER FLOW IN BYPASS FOR ALL MODELS

10.2 On-Line (Run operation)

The following illustration shows circuit power flow when the UPS is operating normally in the On-Line mode. The UPS rectifier, including a boost chopper circuit, converts AC input power to DC power. The boost chopper circuit maintains a constant voltage, with current limiting, for charging the batteries. The inverter section generates a high quality sinu soidal output voltage. The unit's batteries are always maintained in a constantly charged state when the UPS is in the run operation mode.



POWER FLOW IN ON-LINE MODE FOR ALL MODELS

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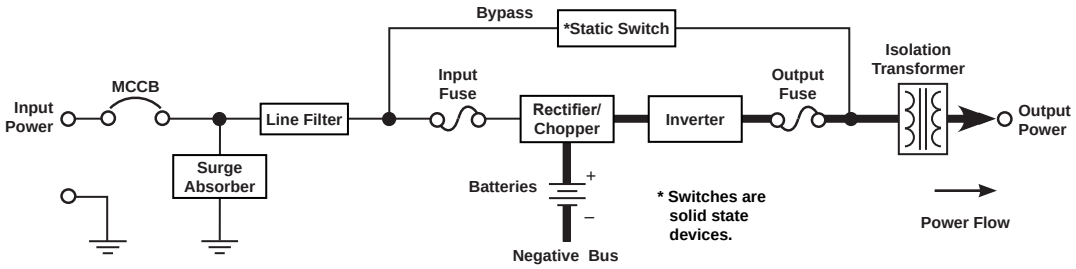
10.3 Battery Backup (On batteries)

The following illustration shows power flow during the battery backup mode. When commercial AC power failures occur, the UPS's batteries instantly begin supplying DC voltage to the UPS's main inverter circuit. This circuit changes (inverts) the DC power into AC power. The AC power is available at the output of the unit.

This back-up process will continue until the UPS's battery voltage drops below a specific minimum level. When this occurs, the batteries will stop supplying power to the load. This minimum level is the rated minimum voltage (Vmin). The rated battery voltage chart on page 19 shows (Vmin). The battery backup time and discharge process is explained on page 19.



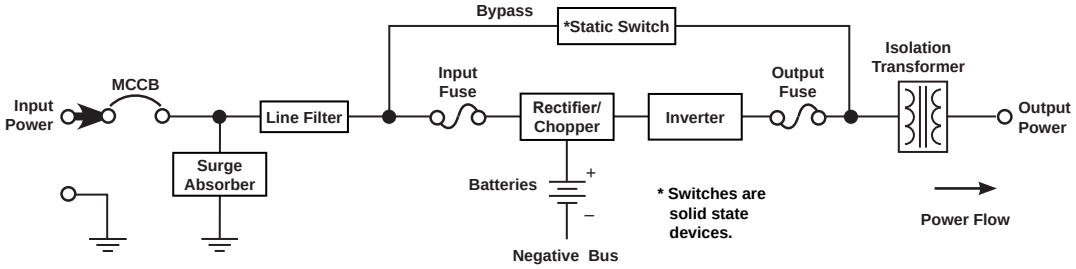
POWER FLOW IN BATTERY BACKUP FOR ALL MODELS

10.4 EPO (Emergency Power Off) Function

These units are equipped with terminals for receiving an emergency power-off (EPO) command via a closed-contact switch at a remote location (see Terminal Block Details on page 11, and terminal block location in Appendix C). This safety feature enables quick shut-down of the UPS's AC input breaker, output and battery circuits.

Usually the emergency power off switch is installed in a central location that is easily accessible to personnel concerned with the operation of the UPS unit and the load equipment connected to it. The EPO function is initiated by pressing the switch to the closed (shutdown) position.

The effect of using the EPO switch is the same whether the UPS unit is in AC input mode, battery backup mode, or the circuit bypass mode. The following figure shows the UPS condition after application of the EPO switch.



POWER FLOW AFTER AN EPO COMMAND FOR ALL MODELS

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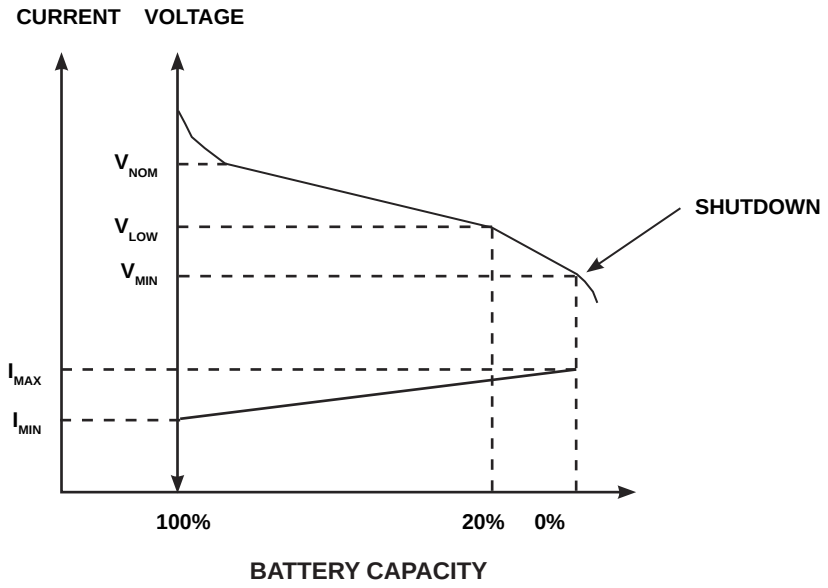
10.5 Battery Backup Time and Discharge Process

The UPS internal batteries provide approximately 5-7 minutes of back-up time depending on the 1600XP/1600XPi unit kVA rating. These times are valid when the unit is operating under full load and at the rated power factor. The exact length of these times will depend on the UPS model used, condition of the batteries, amount and type of load, temperature and other variables. See battery backup time in "Appendix A: 1600XP/1600XPi Specifications" on page A1.

The following illustration graphically shows the battery discharge process at full load conditions.



10.6 Battery Low Voltage Tolerances

Excessive discharge will cause the UPS battery voltage to drop. The chart shown below lists the voltage level at which each UPS low-voltage alarm will sound and at what level the low-voltage condition will cause the unit to automatically shut down.

UPS Capacity	3.6 kVA	6 kVA	8 kVA	10 kVA	14 kVA	18 kVA	22 kVA
Nominal voltage (Vnom)	144 Vdc	216 Vdc	288 Vdc	288 Vdc	288 Vdc	288 Vdc	288 Vdc
Alarm voltage (Vlow)	130 Vdc	192 Vdc	246 Vdc	246 Vdc	246 Vdc	246 Vdc	246 Vdc
Shutdown voltage (Vmin)	114 Vdc	170 Vdc	227 Vdc	227 Vdc	227 Vdc	227 Vdc	227 Vdc

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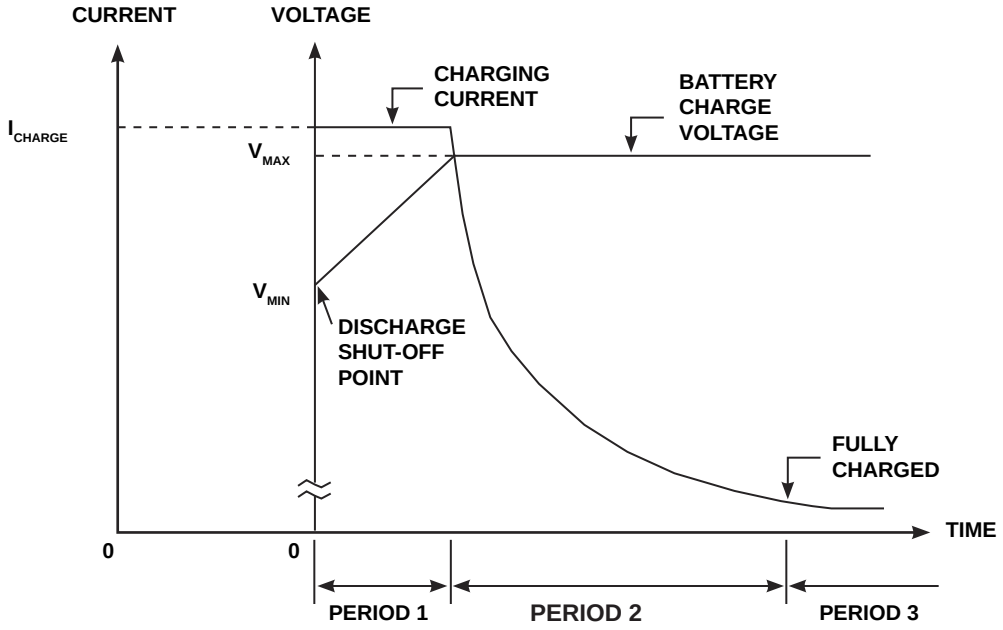
10.7 Battery Recharging

The illustration below shows a graphical representation of the UPS battery recharge process after a full discharge.



The recharge process usually consists of three periods. During the first period, the current is maintained at approximately 1 ampere. This current limit is the maximum value that can be used to charge the batteries (for minimal recharge time) while assuring safety and long battery life. In the second period, constant-voltage control starts and current gradually decreases as the batteries charge to their normal fully charged state. In the third period, a slight trickle current continues to flow into the batteries to keep them fully charged and floating at the normal Vdc level. A full recharge usually requires 24 hours (90% recharge in 12 hours) after a complete discharge.

The following chart shows the rated maximum and minimum battery voltages and the charge current for each of the sizes.

RATED BATTERY VOLTAGES

Model	Vmax	Vmin	Icharge
3.6 kVA	163 V	114 V	1.0 A
6 kVA	245.7 V	170 V	1.0 A
8 kVA	327 V	227 V	1.0 A
10 kVA	327 V	227 V	1.0 A
14 kVA	327 V	227 V	1.0 A
18 kVA	327 V	227 V	1.0 A
22 kVA	327 V	227 V	1.0 A

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10.8 Battery Test

The 1600XP/1600XPi allows the user to conduct automatic or manual battery tests as desired. The following steps detail the battery test procedures.

Automatic Battery Test:

1. The Automatic Battery Test Procedure is performed only if it is enabled during startup.
2. Once the battery test is completed, Cmd **654 - Battery Test Condition Status** is set to **"Battery Test Prohibited"**. It will be re-enabled once timer Cmd **655 - Battery Test Frequency** is reached.

Manual Battery Test:

The UPS must be in **Online** mode.

1. Change the security setting to "ADMIN".
2. On the display, press the **Monitor** tab.
3. On the display, press the **C&C** key.
4. Use the Page (**<<** and **>>**) and Record (**<** and**>**) navigation keys to verify the following:
    a. Cmd **652 - Battery Test Startup** must be set to **"Disable"**
    b. Cmd **653 - Enable Battery Test** set to **"Enable"** to allow the battery test to be performed.
    c. Cmd **655 - Battery Test Frequency** should be set to **"0"** (Daily Test)
    d. Cmd **654 - Battery Test Condition Status** should read **"Enable - Battery Test OK to perform"**

    *NOTE: If Cmd **654** is **"Disable"**, the user will have to power down and restart the unit to perform the battery test.*

    e. Navigate to Cmd **609 - Requested State** and press the **"BattTest"** button on the display.

- If the test passes, the display returns to the Monitor screen.
- If the test fails, the display returns to the Monitor screen and displays BTSTFL in the warning section at the bottom left of the display, and the "Warning" LED blinks until the fault is cleared.

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11. Operating the UPS

The 1600XP/1600XPi should be installed by a certified electrician. Once installed, the 1600XP/1600XPi is designed to be operated by any user. Anyone not familiar with this UPS should read the manual before attempting to operate it.

11.1 Initial Startup (First Power-Up)

The first time the UPS is activated after being shipped from the factory, these parameters need to be set by the customer for site specific ratings. Input Rated Voltage, Output Rated Voltage, UPS Date, and UPS Time. Review Sections 13 and 14 before initializing the UPS.

1. The input frequency defaults to 60 Hz.
2. The first screen displayed during the initial startup sequence requires the operator to select the nominal Input Voltage.
3. Select from 208V, 230V, or 240V, and press the **Write** key.

   If the command has been accepted, the word “Successful” will appear at the bottom left side of the display.
4. Repeat the process in step 3 in selecting the Rated Output Voltage.
5. Use the keypad to type in the current date in the format: *Day mm/dd/yyyy. (e.g. Mon 10/05/2009)* and press **Write**.
6. Use the keypad to type in the current time in 12 hour format: *hh:mm AM* (e.g. *12:15 PM)* and press **Write**.
7. The Main screen is now displayed. Verify the UPS is in BYPASS mode. The mode (lower right side of the display) should display **Bypass**. If it does not display **Bypass,** press and momentarily hold the **STOP** button on the Main display.

NOTE: The internal batteries recharge in both Bypass and On-Line modes. As soon as the input breaker is closed, the internal batteries will begin recharging.

8. With the UPS in bypass mode, cycle power to the UPS as follows:
   - At the rear of the UPS switch the main circuit breaker MCCB to OFF.
   - Leave the UPS off until the DC bus is safely discharged (approximately 5 – 10 minutes).
   - Restart the UPS by switching the main circuit breaker ON.

The table below summarizes the initialization parameters:

ID	Command	Options
111	Rated Vin	Select from 208V, 230V, or 240V, and press **Write**. (This parameter sets the multiplier for the Over-/Under voltage detectors.)
215	Rated Vout	Select from 208V, 230V, or 240V, and press **Write**. (This parameter sets the multiplier for the Over-/Under voltage detectors.)
634	UPS Date	Input the date in this format: *Mon 10/05/2009* and press **Write**.
635	UPS Time	Input the current time in 12 hour format: *12:15 PM* and press **Write**.

11.2 Battery Parameter Settings

Table 11-1 for setting the battery parameters during initial setup for these configurations: Stand-alone UPS; UPS + 1 Battery Cabinet; UPS + 2 Battery Cabinets.

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Table 11-1 Initial Battery Parameter Settings

Parameter	Description	UPS Size	UPS Only	UPS + 1 BC[1]	UPS + 2 BC[1]
511	Internal Battery Capacity in A-hr	All	9	9	9
512	# Internal Batt. Packs in Series String	3.6 kVA	2	2	2
		6 kVA	3	3	3
		8-22 kVA	4	4	4
513	# Internal Batt. Strings in Parallel	3.6 - 14 kVA	1	1	1
		18 - 20 kVA	2	2	2
522	Enable Ext. Battery Cabinet BC1	All	0	Enable	0
523	Enable Ext. Battery Cabinet BC2	All	0	Enable	Enable
524	External Batt. Cabinet Status	All	0	1	1
525	# External Batt. Packs in Series String UH31-BC-0370 H3B-BC-0370	3.6 kVA	0	3	3
	UH31-BC-0650 H3B-BC-0650	6 kVA	0	2	2
	UH31-BC-1825 H3B-BC-1825	8-22 kVA	0	3	3
526	# External Batt. Strings in Parallel	3.6 kVA	0	3	6
		6 kVA	0	2	4
		8-22 kVA	0	3	6
527	External Battery Capacity in A-hr	All	0	9	9

1 These settings apply to 1600XP/1600XPi matching battery cabinets.

11.3 Starting the UPS (Normal)

Turn the main circuit breaker (MCCB) on the back of the UPS (see Appendix A) to the **ON** position. The breaker should remain in the **ON** position.

Verify that the **On-Line** LED on the front panel (see “12.1 Front Panel Layout” on page 23) lights green.

The UPS will now be supplying power in the On-Line mode. If the On-Line LED is not illuminated push and hold the RUN key for approximately 3 seconds.

NOTICE

When running the UPS for the first time charge the batteries for at least 24 hours (input breaker on) before operating the connected load. Failure to do so will result in reduced battery backup time.

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11.4 Stopping the UPS

To stop the UPS press and hold the **STOP** key approximately 3 seconds until the **On-Line** LED changes from green to off (audible beep). The UPS is now in the bypass mode.

NOTICE

If the input breaker is turned off while UPS is in the bypass mode, the output power stops. Any load devices will lose power.

Ensure that all sensitive loads have been previously shut down.

To completely stop the UPS, turn the input breaker at the back of the UPS to the **OFF** position.

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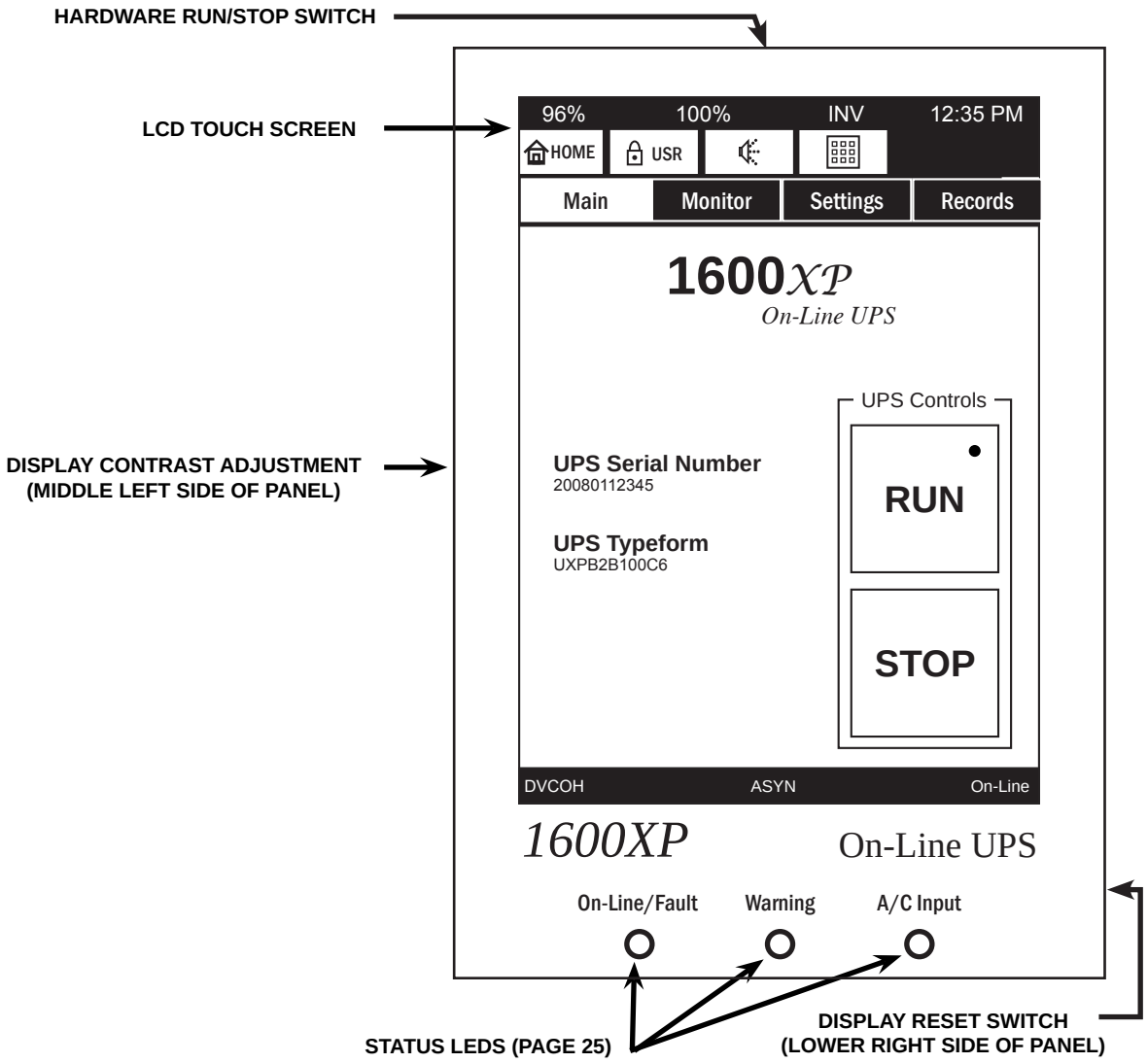
12. Display and Keys

12.1 Front Panel Layout

The front panel consists of several elements for monitoring and operation of the UPS. Panel components are shown in the illustration below:



12.2 Display Manual Controls

Hardware Run/Stop Switch – Pressing the contact switch momentarily will toggle the UPS state between RUN and Bypass. For Instance, while the UPS is in RUN mode, pressing the switch will change the mode to Bypass. Pressing the switch again will switch the UPS back to RUN mode.

Display Reset Switch – When necessary, the touchscreen display can be reset by using a thin probe, such as a paper clip, to press the display reset switch.

Display Contrast Adjustment – The display is shipped with the display adjusted for optimum visibility. If necessary use a trimmer adjustment tool to fine tune the display contrast for improved visibility.

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13. LCD Touchscreen Layout

The touchscreen serves as input and display. Touch the active portion of the display to execute a command.

13.1 Startup Display

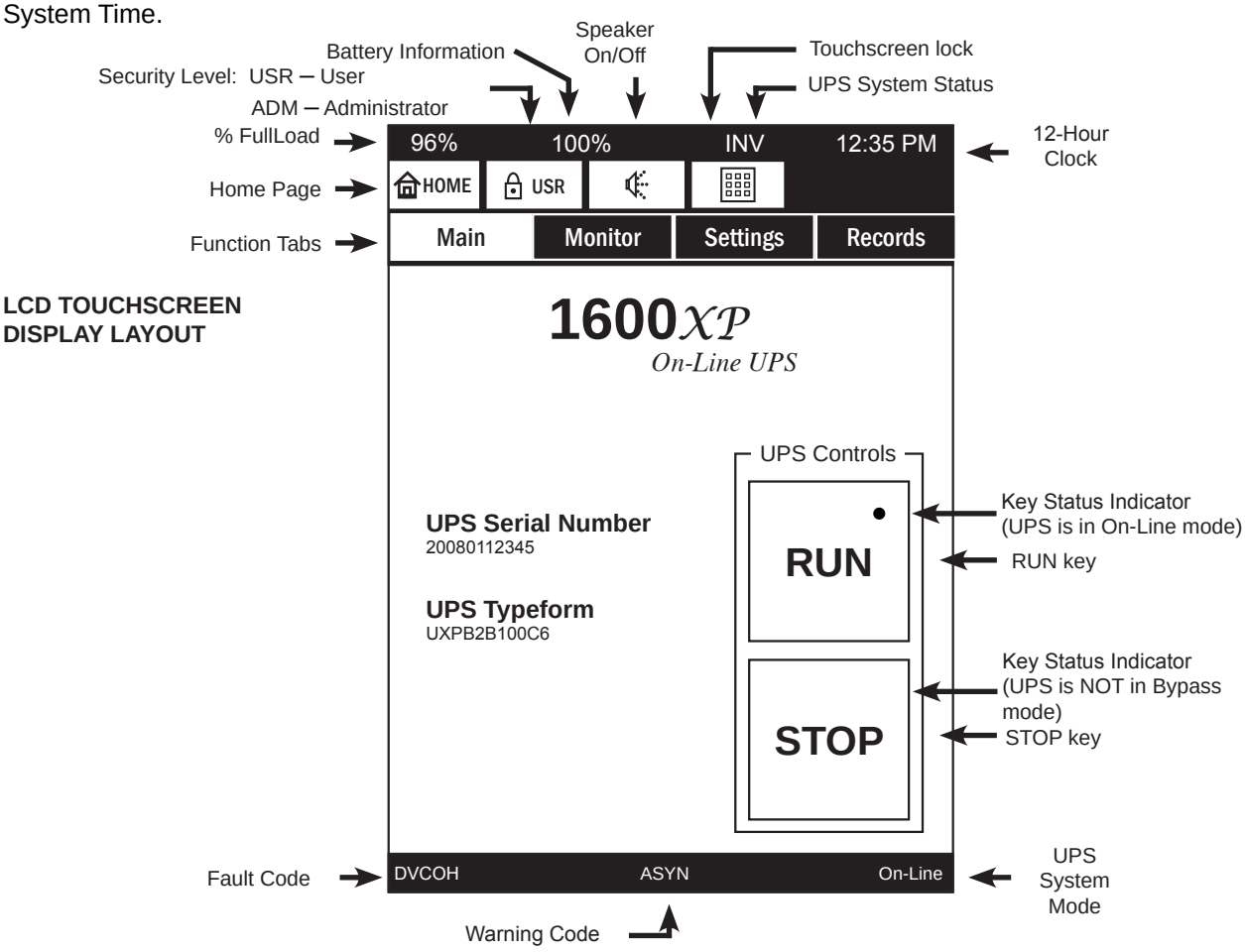
The default opening screen for the UPS is the **Main** screen. The operator can begin operating the UPS immediately by pressing the RUN key.

Only the **Main** and **Settings** tab screens allow operator input. The **Monitor** and **Records** display screens are read-only. No data can be entered in these screens

From the **Main** screen, the UPS can be placed On-Line by pressing RUN, or placed in Bypass Mode by pressing STOP. A key status indicator at the upper right-hand corner of each key indicates which key is active: a dot indicates that key is active; no dot indicates that key is not active. See the illustration below.

The **Settings** screen allows modification of the UPS operating parameters.

At the top of the display are four status indicators: % Load, Battery Information, UPS System Status, and System Time.



At the top left of the display are a bank of four touch-sensitive keys:

Home – Pressing **HOME** key returns the display to the top menu of the currently selected tab.
Security Level – Pressing the **Security Leve**l key activates the log-in security screen.
(Speaker) – Pressing the **Speaker** key will disable/enable the audible alarm.
Touchscreen Lock – Locks touchscreen except for this key.

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The second row of keys are the function tabs.
At the bottom of the display three event codes display the latest operational information: Faults, Warnings, and the current UPS System Mode. (See page 52 to page 55.)

13.2 Operating Keys

The icons listed in the table below identify the touch-sensitive keys on the main touchscreen. The keys are different types of controls that can be activated by pressing that area of the touchscreen.

Key	Functional Description
RUN ▸ RUN	Run Key - Press and hold the key 1-2 seconds (until the UPS 'beeps') to put the UPS in On-Line mode. The active status indicator (upper right dot) will appear on the RUN key and disappear from the STOP key.
STOP ▸ STOP	Stop Key - Press and hold the key 1-2 seconds (until the UPS 'beeps') to put the UPS in Bypass mode. The active status indicator (upper right dot) will appear on the STOP key and disappear from the RUN key.
HOME	Home Key - Press to return to top menu of respective tab.
USR	Security Level Key. Press to open security login screen.
	Event Alarm Mute Key- Press to silence current event alarm. Alarm Muted Key- Alarm remains silenced until next event.
	Touchscreen Enabled Key- Press to disable (lockout) all touchscreen keys except this key. Touchscreen Disabled Key - Press to enable (un-lock) touchscreen.
Main Monitor Settings Records	Four function tab keys: Main, Monitor, Settings, Records Main - Start and Stop keys, UPS Serial number and typeform. Monitor - Shows Mimic display for accessing Input/Output/Bypass/Battery data. Settings - Provides access to adjustable performance parameters. Records - Access fault, warning and other records.
	As displayed on: **Monitor and Settings** screens: << < BAT 2 / 3 > >> **Records** screens: << < 2 / 3 > >>
<<	Go To First Page/Record Key.
<	Go to Previous Page/Record Key.
BAT	Menu selection under Monitor and Settings tabs.
2 / 3	Shows the current page or record number, and total number of pages or records.
>	Go to Next Page/Record Key.
>>	Go To Last Page/Record Key.

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13.3 Status Indicators

The four top and three bottom UPS status Indicators on the main screen and their meanings are listed in the table below.

Indicator	Functional Description
96%	Shows the current load percentage.
100% / 11' 100% / 9' 35" 100% / N/A	Battery Information: In On-Line and Battery Back-up mode the display alternates between battery charge percentage and estimated remaining battery runtime in: Format xx M – Minutes for Runtimes > 10 min. xx M.xx S – Minutes and Seconds for Runtimes < 10 min. In other modes, the display alternates between battery charge percentage and "N/A."
INV	Shows current UPS Status. Indicator will change as the UPS status changes. For a detailed listing see page 55.
12:35 PM	System Time
DVCOH	Fault Description Code – For a detailed listing see page 52.
ASYN	Warning Description Code – For a detailed listing see page 53.
On-Line	Current Operating Mode of the UPS – For a detailed listing see page 55.

13.4 Light Emitting Diodes (LED)

The following table describes the front panel LED behaviors and the associated meaning.

LED	Behavior	Significance/Meaning
◯ On-Line/ Fault	Green - ON	UPS is in On-Line, Backup, or Battery Test mode.
	Green - OFF	UPS in Bypass mode.
	Green - OFF	Load Discharging
	Red - ON	One or more faults occurred. See *Records: Faults* for details.
	Red - Flashing	Charger overvoltage occurred.
	Red - OFF	No fault occurred.
◯ Warning	Amber - ON	Service Call needed, **Less than 6 mo. of Battery Life** or **Battery Life End**.
	Amber - Flashing	One or more Warnings occurred. See *Records: Warnings* for details.
	Amber - OFF	No Warning (Normal, UPS in operation).
◯ AC Input	Green - ON	Input voltage is within specified range.
	Green - Flashing	Input voltage is over specified range.
	Green - OFF	Input voltage is under specified range.

NOTE: On-Line/Fault LEDs - Appear Amber if Green and Red flash concurrently.

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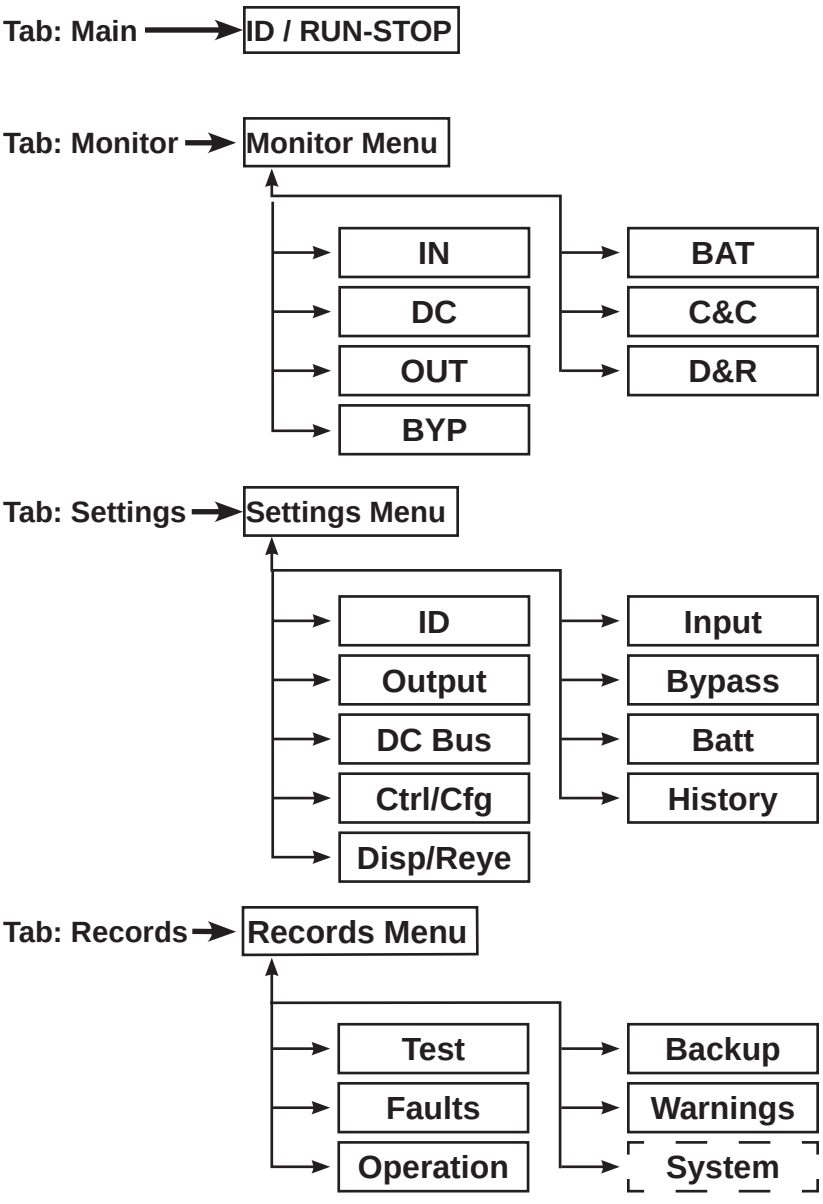
14. Touchscreen Menu Tree

14.1 Front Panel Layout

The diagram below shows the menu tree for the touchscreen display. The four folder tabs and their associated sub-menu choices are shown on the left, and a description of the displays /choices are detailed on the right.



MAIN – Displays the starting screen. It has a **RUN** and **STOP** key that place the UPS in In-Line or Bypass mode respectively.

MONITOR – Graphically displays the current status of the UPS (On-Line, Backup, Bypass, Shutdown) in an interactive power flow block diagram. Selecting one of the blocks provides additional detailed data of the Input (**IN**), Output (**OUT**), Bypass (**BYP**), Battery (**BAT**), and DC Bus (**DC**), Control & Configuration (**C&C**), and Display & External (**D&E**) devices.

SETTINGS – Allows monitoring and/or modification of UPS parameters. Parameters that can be viewed or modified vary depending on the security level of the login password entered using keypad.

Records – Displays the most recent 32 **Test**, **Backup**, **Faults**, **Warning**, **Operation**, and **System** change records.

System records are only available at the distributor and depot security levels.

In any record set, if more than 32 incidences have occurred, only the most recent 32 record are retained in each report.

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14.2 Keypad Controls

The keypad uses a alphanumeric format similar to that used on telephone 12-key keypad. Rapidly press a key 1 to 5 times to select the desired character.

For instance, quickly press the **7PQRS** key four times to enter an “R.”

Pause a moment, then key in the next value.

Press the backspace key to delete the last character entered.

The keypad can be toggled to access to lower case letters and the space “ “ key by pressing the **Shift** key. Enter the lower case letters as above.

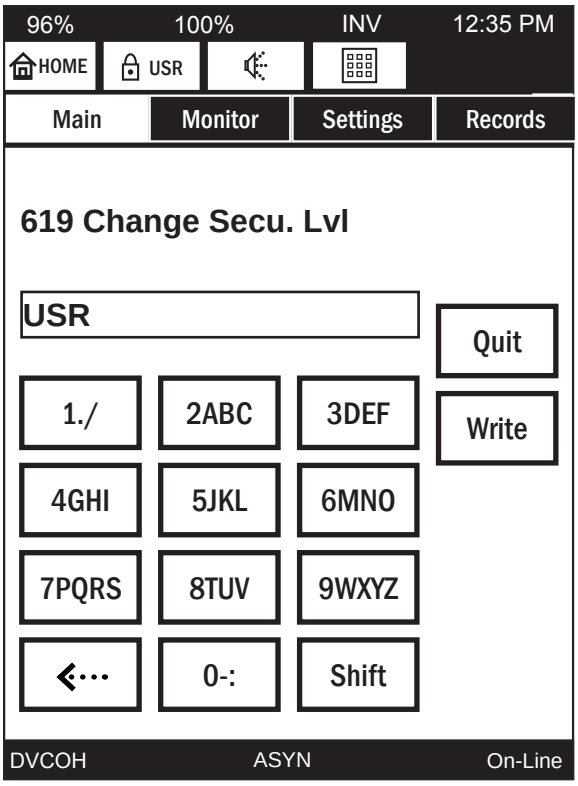
The Space key is used to enter a space between alphanumeric characters.

Example: By using the additional characters available with the shift key you can type in a device name:

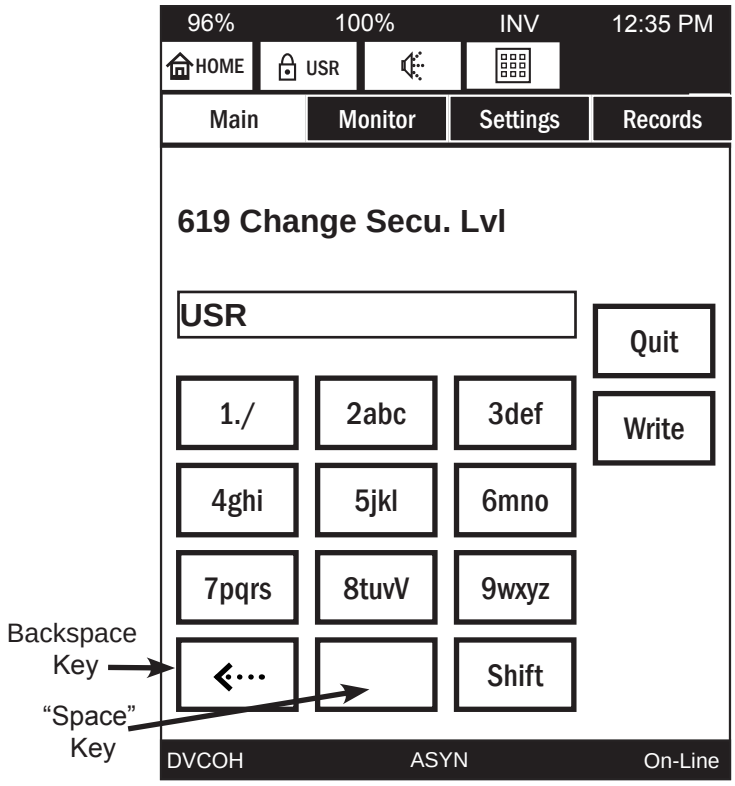
“Toshiba H3” instead of “TOSHIBAH3”

Return to the Upper Case format keypad by pressing **Shift** again.

Exit the keypad display by pressing either the **Quit** or **Write** key.



KEYPAD



SHIFTED KEYPAD

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14.3 Screen: Security Passwords & Keypad

The UPS has several levels of security password available: USER (USR) , ADMIN (ADM), and other security levels for use by service and factory representatives.

The security level is indicated on the Security Key.

The UPS stays in a security level until a new level is entered.

For example, once the UPS is placed in the USR level, it remains at that level until the security level is changed.

Login:

1. Press the **Security Level** key, [USR].
2. The keypad replaces the Main screen to allow entering the password. By default the password are set to:

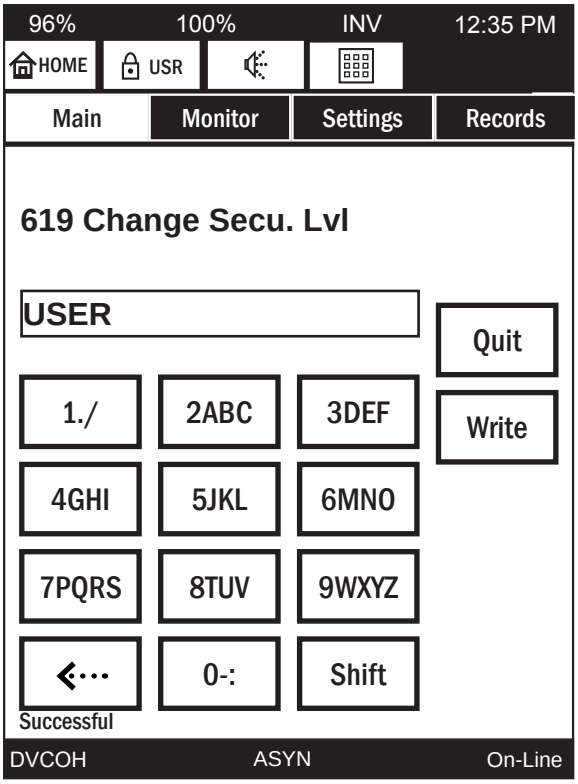
   User: USER

   Administrator: ADMIN
3. Typing in USER in the keypad will change the security level to User. Enter the password using the alphanumeric keys.
4. Press **Write** to store the password in the UPS. If the password is accepted the text “Successful” will display at the bottom left of the touchpad, as shown here.

If the password entered was not accepted, the text “Error15 – Write Function” or some similar message will indicate that the password or level change was not accepted.

5. Press the **QUIT** key and the keypad will close and the original display restored.

This same keypad is used for data input for parameters in the Settings tab.



KEYPAD

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14.4 Forget/Reset Password

The UPS has several levels of security password available: USER (USR) , ADMIN (ADM), and additional security levels for use by service and factory representatives.

In the event that you forget or need to reset the ADMIN password, follow these steps:

Reset ADMIN Password:

1. Ensure the **Security Level** key, [USR]. , shows the unit is in USER mode.
2. If necessary, change to USER mode as shown on page 29.
3. Press the **Settings** tab.
4. Press the **CTRL/CFG** key.
5. Use the page (<< and >>) and record (< and >) keys to select Cmd **621 - Reset Admin PWD**.
6. Press **Reset**.
7. Press **Write** to store the default password in the UPS. If the password is accepted the text “Successful” will display.

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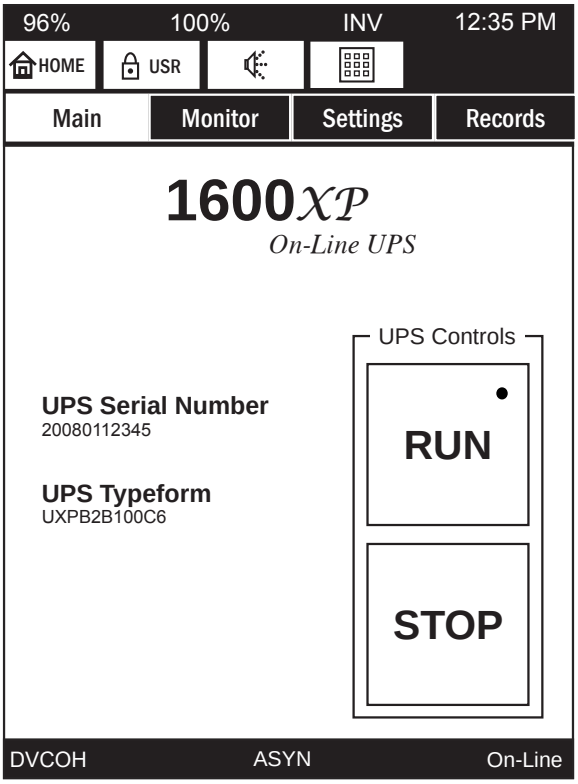
15. Screen Tab: Main

The Main tab is also the opening tab on startup for the UPS. Press **RUN** to place the UPS in On-Line mode, and press **STOP** to place the UPS in Bypass mode.

RUN/Stop the UPS
Press and momentarily hold (approximately one to two seconds) the **RUN** or **STOP** key to place the UPS in On-Line or Bypass mode respectively.



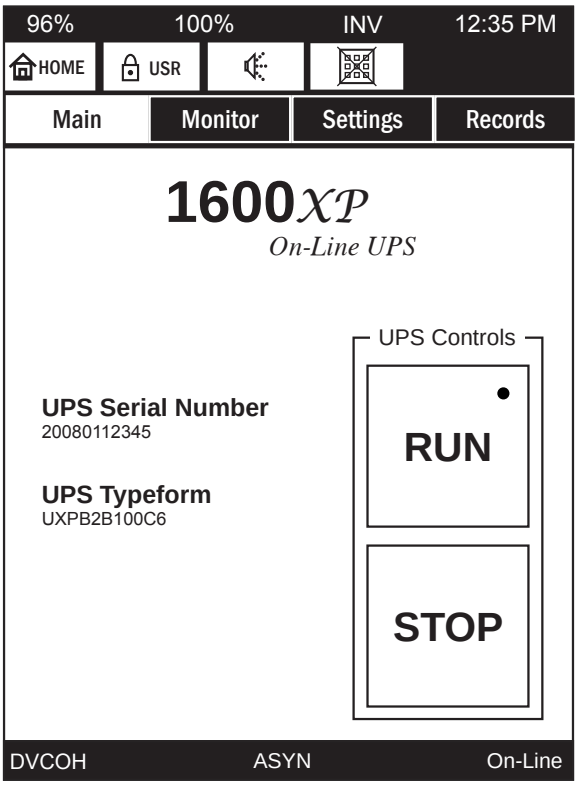
MAIN SCREEN

The touchscreen display can be disabled for safety or convenience by pressing the touchscreen lockout key, .

(NOTE: The touchscreen lockout key is disabled when the screen is in keypad mode.)

The Lockout key will change to and the touch-screen will not respond to any input except a touch to the lockout key.

Touching the lockout key again will toggle the lockout off, the graphic will change to indicating the touch-screen is active.



MAIN SCREEN DISABLED

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16. Screen Tab: Monitor

The top screen under the Monitor tab is a graphical power flow block diagram that acts as a mimic display showing power flow through the UPS sections (Input, Output, Bypass, and Battery) and the UPS status (On-Line, Backup, Bypass, Shutdown). Additional information screens are available that display the detailed status of the various parameters for the Input, Output, Bypass, Battery, DC Bus, System Status, and Remote Communications.

The Monitor Tab illustration, next page, shows the screens available and how to navigate between them.

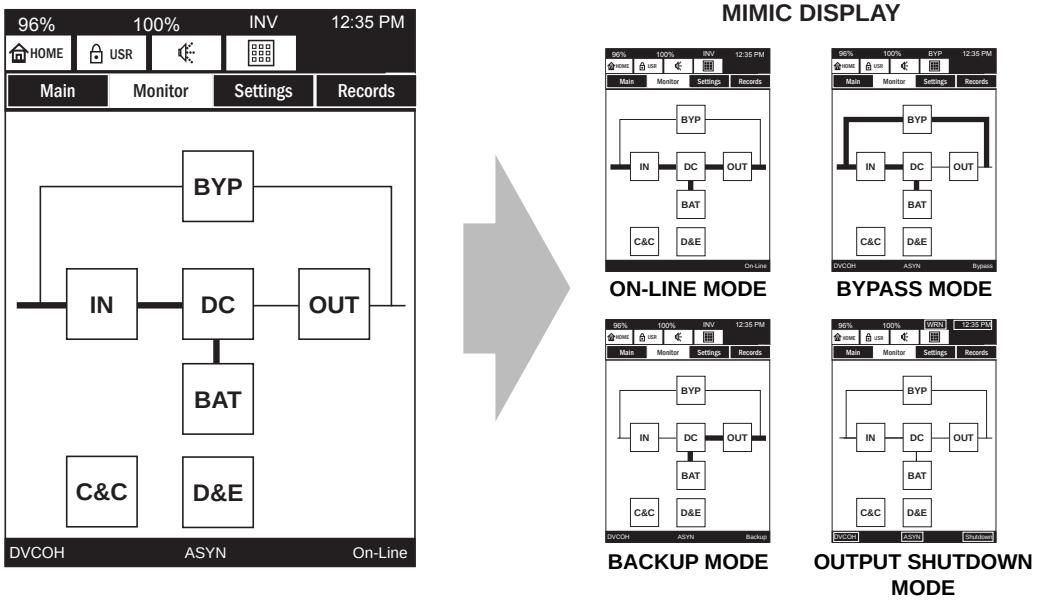
Mimic Display
In the mimic display of the Monitor Tab screen, the four UPS selection keys, Input (**IN**), DC Bus (**DC**), Output (**OUT**), Bypass (**BYP**), and Battery (**BAT**) are connected by lines indicating power flow. A thick line indicates power flowing, and thin line indicates no power flowing.

The Monitor display, below, shows the UPS in Shutdown Mode: Power is flowing to charge the battery, but no power is going to the Bypass or Output.

Monitor Details
Press the **IN**, **BYP**, **OUT**, **DC**, or **BAT** key on the mimic display to view the parameter details for that section of the UPS.

The MONITOR TAB figure on the following page shows the relationship of the various data displays.

Press the Home key, Home, to return to the opening Monitor Tab screen.



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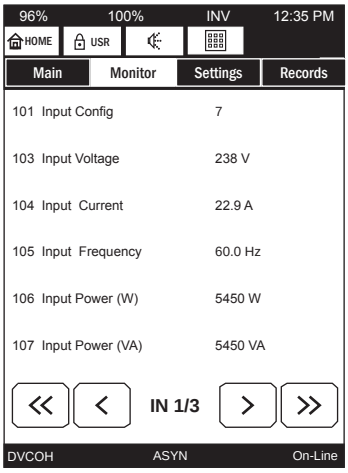
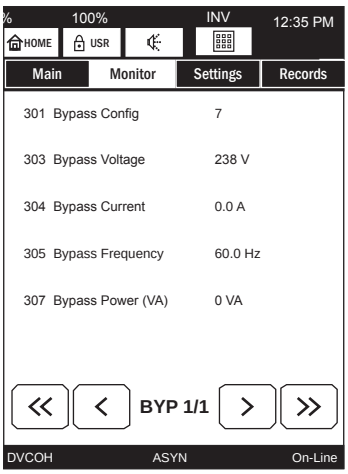
MONITOR TAB

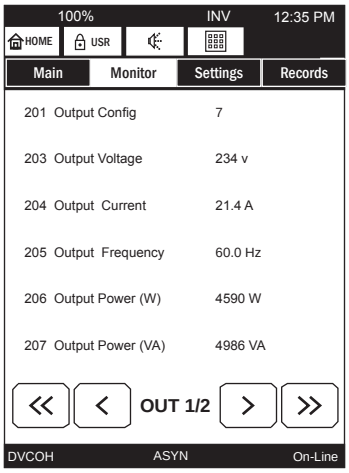
IN


96% 100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
101 Input Config 7
103 Input Voltage 238 V
104 Input Current 22.9 A
105 Input Frequency 60.0 Hz
106 Input Power (W) 5450 W
107 Input Power (VA) 5450 VA
IN 1/3
DVCOH ASYN On-Line

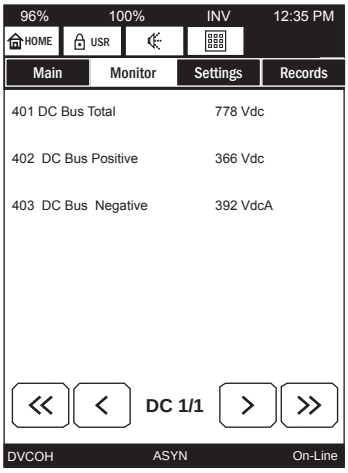
BYP

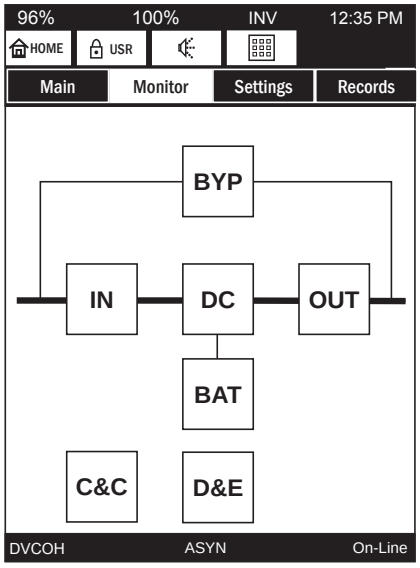

100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
301 Bypass Config 7
303 Bypass Voltage 238 V
304 Bypass Current 0.0 A
305 Bypass Frequency 60.0 Hz
307 Bypass Power (VA) 0 VA
BYP 1/1
DVCOH ASYN On-Line

OUT

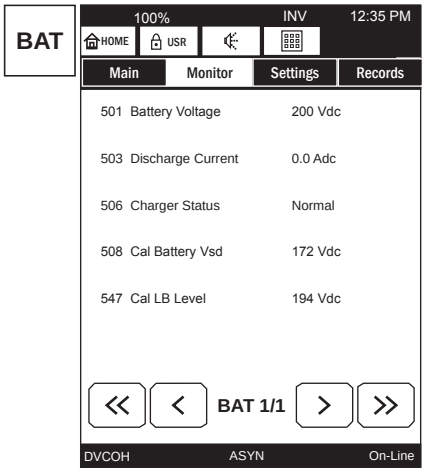

100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
201 Output Config 7
203 Output Voltage 234 v
204 Output Current 21.4 A
205 Output Frequency 60.0 Hz
206 Output Power (W) 4590 W
207 Output Power (VA) 4986 VA
OUT 1/2
DVCOH ASYN On-Line

DC

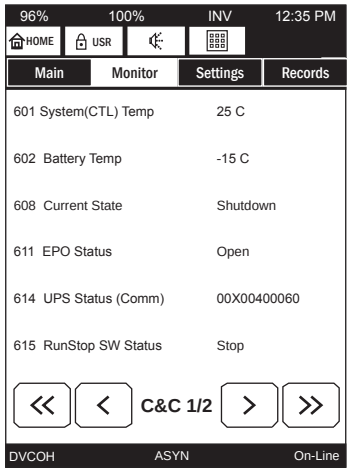

96% 100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
401 DC Bus Total 778 Vdc
402 DC Bus Positive 366 Vdc
403 DC Bus Negative 392 VdcA
DC 1/1
DVCOH ASYN On-Line



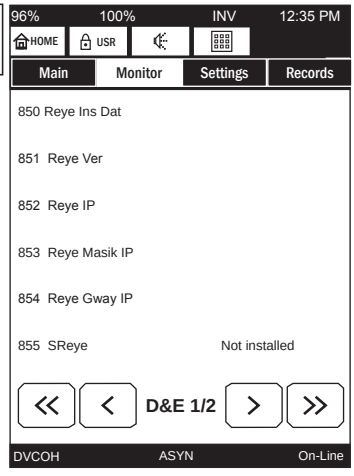
BAT


100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
501 Battery Voltage 200 Vdc
503 Discharge Current 0.0 Adc
506 Charger Status Normal
508 Cal Battery Vsd 172 Vdc
547 Cal LB Level 194 Vdc
BAT 1/1
DVCOH ASYN On-Line

C&C


96% 100% INV 12:35 PM
HOME USR
Main Monitor Settings Records
601 System(CTL) Temp 25 C
602 Battery Temp -15 C
608 Current State Shutdown
611 EPO Status Open
614 UPS Status (Comm) 00X00400060
615 RunStop SW Status Stop
C&C 1/2
DVCOH ASYN On-Line

D&E



MIMIC DISPLAY

Press any key on the mimic display (**IN**, **DC**, **OUT**, **BYP**, **BAT**, **C&C**, **D&E**) to display the associated parameters.

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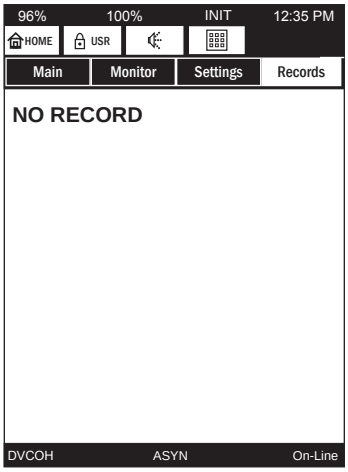
16.1 Records

If the selected Record buffer has no records, the display will return the message “NO RECORD.”

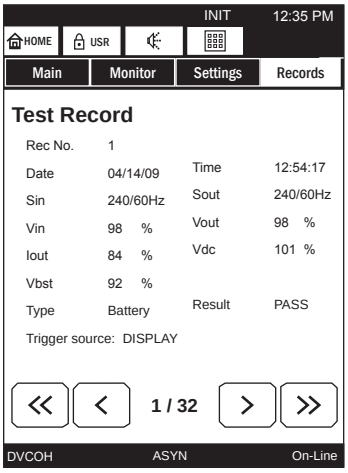
Each record file can be accessed by pressing the labeled key, and the records paged through using the standard next record, previous record, first record, and last record control keys at the bottom of the touchscreen. (See page 24.)

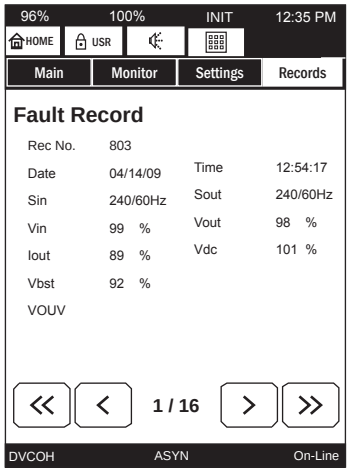
Samples of the five record screens and the data they record are shown below.

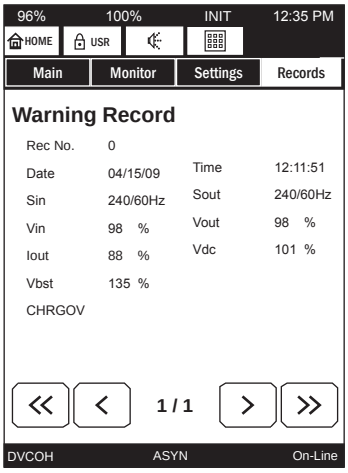


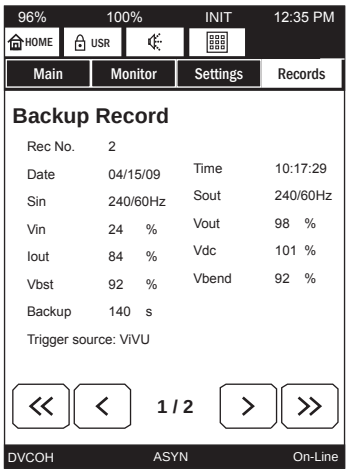
EMPTY BUFFER SCREEN

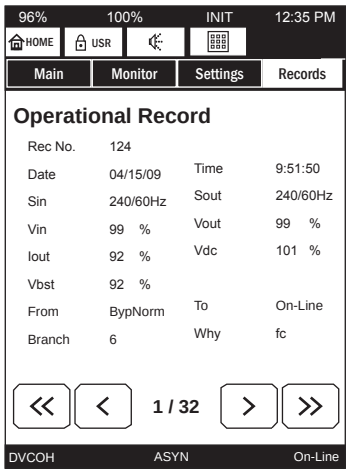
SAMPLE RECORD SCREENS











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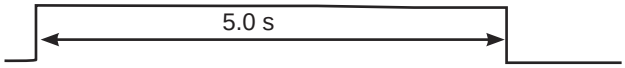
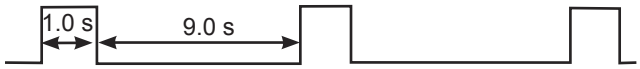
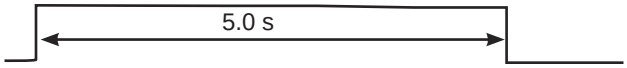
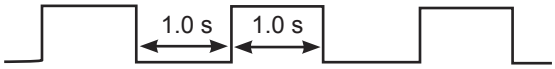
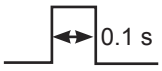
16.2 Audible Alarm Functions

An audible alarm (buzzer) will sound when the UPS is in the battery backup mode, has a fault, has low battery voltage, or is in an overload condition. The buzzer will also beep each time an effective item is touched on the touchscreen. The following chart shows the buzzer pattern durations for each condition. Time units are shown in seconds.

AUDIBLE ALARMS

Condition	Audible Pattern
Any Fault (Interrmittant buzz until fault clears)	
Switch to Backup (Single five-second buzz)	
Backup Operation (Intermittant buzz once every ten seconds)	
UPS Battery Shutdown Voltage (Batt. Voltage 79%)	
Warnings: OL110 (Overload Timer) LB (Low Battery – Batt. Voltage 90%) BLFN (Battery Life Pre-alarm – Batt exp in 6 mo.) BLFE (Battery Life End) CHRGOV (Charger Over Voltage) BTSTFL (Battery Test Fail) BOH (Battery Overheat) AOH (Ambient Overheat) CLMT (Current Limit) DCER (Display Disconnected) BDEPL (Battery Depletion)	
Touching Effective Item on Touchscreen	

The buzzer can be silenced by selecting the Settings tab, then set the Mute Enable parameter to 1. This will turn off the buzzer for the current alarm status, but the buzzer will still sound when the next Fault/ Warning condition occurs.

The buzzer can be disabled by selecting the Settings tab then setting the Mbuzzer parameter to 0. This will disable the alarm so that no alarm sounds for any Fault or Warning condition.

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17. Screen Tab: Settings

The Parameter Table in Appendix B lists the 1600XP/1600XPi Settings parameters that can be viewed in the MONITOR tab.

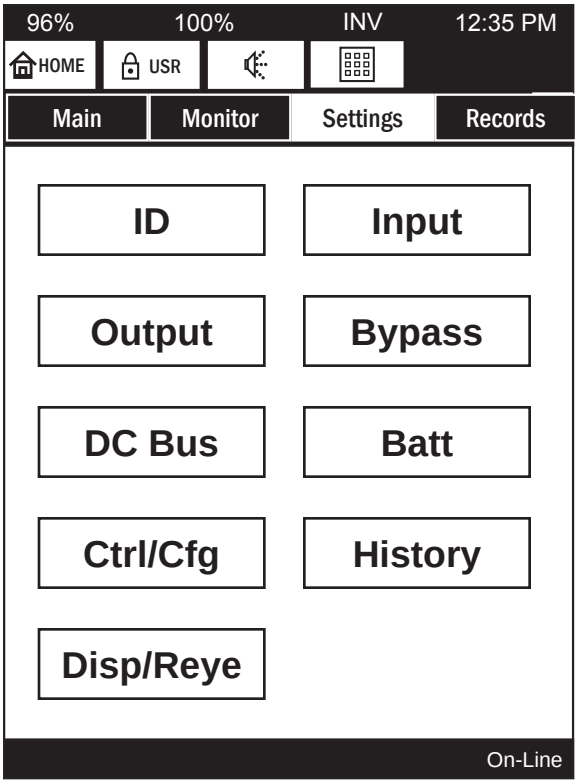
Example: The Settings parameter **Batt Test Freq** (Battery Test Frequency) can be viewed by USR (User) level and above. However, only ADM (Administrators) and above can edit)change) the parameter value.

Each key displays a block of relevant command parameters:

Key: Cmd ID - (Range) Parameter type

- **ID –** (000-099) UPS specific information such as serial number, software versions, installation date.
- **Input –** (100-199) Input measured/calculated data such as input voltage, frequency, current, power, over-/under- voltage settings.
- **Output –** (200-299) Output measured/calculated data such as output voltage, frequency, current, power, over-/under- voltage settings.
- **Bypass –** (300-399) Bypass data such as configuration, voltage, current, power, OV detection level.
- **DC Bus –** (400-499) Data such as Total voltage, rated voltage, Positive and Negative bus voltages.
- **Batt –** (500-599) Battery voltage, charger status, total discharges, shutdown voltage.
- **Ctrl/Cfg –** (600-699) Control and configuration list system and battery temperatures, system status, startup delay, auto-transfer window, restart mode.
- **History –** (700-799) History lists metrics like system operation time, total over loads, hi system temp.
- **Disp/Reye –** (800-849) Display specific parameters like Disp. Firmware version, sleep timer, buzzer status, display calibration points, and RemotEye 4 settings.

  (850-859) lists the RemotEye 4 IP address, IP Mask, Status, Baud Rate, datalink status.



SETTINGS OPENING SCREEN

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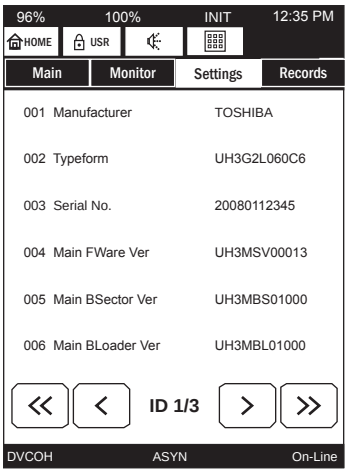
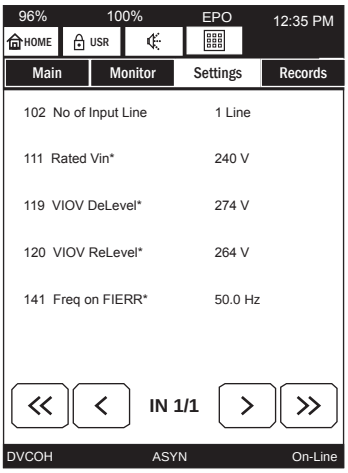
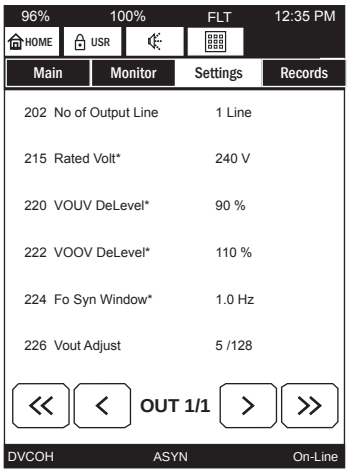


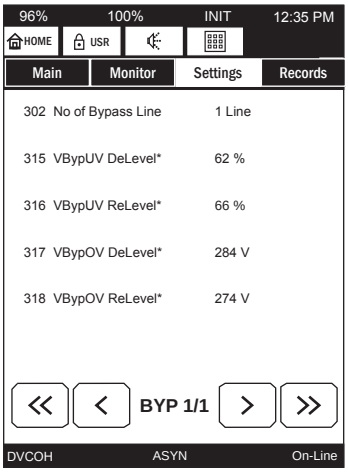
ID BLOCK


96% 100% EPO 12:35 PM
HOME USR
Main Monitor Settings Records
102 No of Input Line 1 Line
111 Rated Vin* 240 V
119 VIOV DeLevel* 274 V
120 VIOV ReLevel* 264 V
141 Freq on FIERR* 50.0 Hz
IN 1/1
DVCOH ASYN On-Line

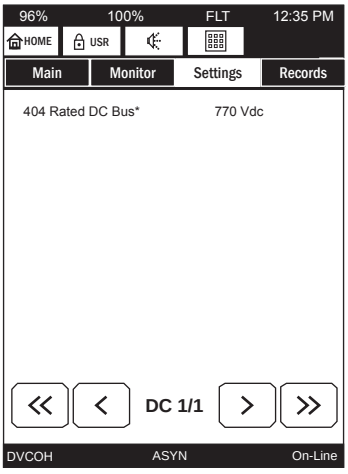
INPUT BLOCK


96% 100% FLT 12:35 PM
HOME USR
Main Monitor Settings Records
202 No of Output Line 1 Line
215 Rated Volt* 240 V
220 VOUV DeLevel* 90 %
222 VOOV DeLevel* 110 %
224 Fo Syn Window* 1.0 Hz
226 Vout Adjust 5 /128
OUT 1/1
DVCOH ASYN On-Line

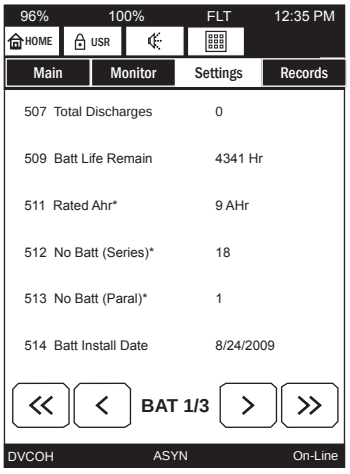
OUTPUT BLOCK


96% 100% INIT 12:35 PM
HOME USR
Main Monitor Settings Records
302 No of Bypass Line 1 Line
315 VBypUV DeLevel* 62 %
316 VBypUV ReLevel* 66 %
317 VBypOV DeLevel* 284 V
318 VBypOV ReLevel* 274 V
BYP 1/1
DVCOH ASYN On-Line

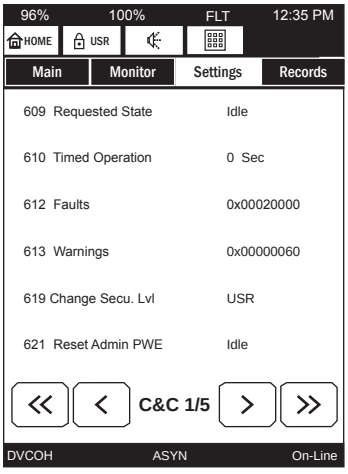
BYPASS BLOCK



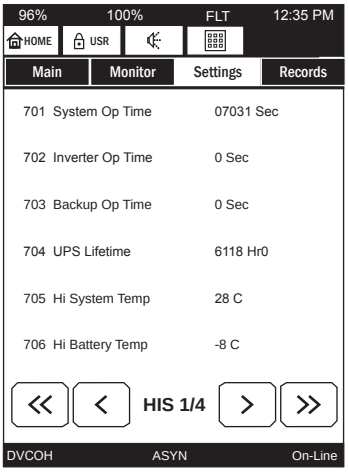
DC BUS BLOCK


96% 100% FLT 12:35 PM
HOME USR
Main Monitor Settings Records
507 Total Discharges 0
509 Batt Life Remain 4341 Hr
511 Rated Ahr* 9 AHr
512 No Batt (Series)* 18
513 No Batt (Paral)* 1
514 Batt Install Date 8/24/2009
BAT 1/3
DVCOH ASYN On-Line

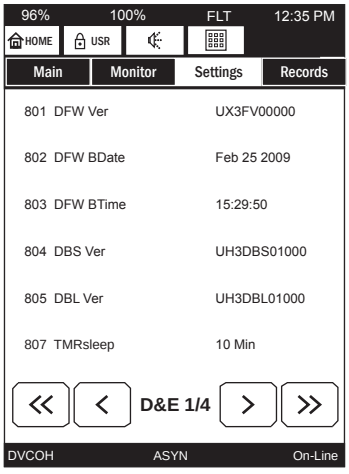
BATT BLOCK



CTRL/CFG (SCC)BLOCK


96% 100% FLT 12:35 PM
HOME USR
Main Monitor Settings Records
701 System Op Time 07031 Sec
702 Inverter Op Time 0 Sec
703 Backup Op Time 0 Sec
704 UPS Lifetime 6118 Hr0
705 Hi System Temp 28 C
706 Hi Battery Temp -8 C
HIS 1/4
DVCOH ASYN On-Line

HISTORY BLOCK



DISP/REYE BLOCK

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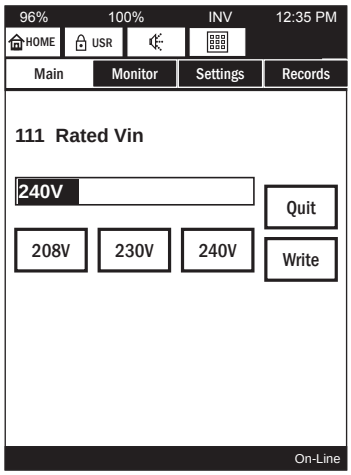
17.1 Changing UPS Parameter Settings

Press the parameter to be changed and the display will open with an appropriate data entry screen. Settings that cannot be changed will respond with “Item cannot be changed” shown at the bottom of this page.

Example 1

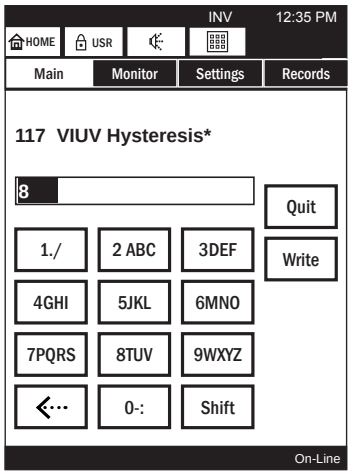


Example 1: Some parameters will display a set of two or more fixed values.

The UPS is designed to operate with any of several discrete input voltages. The value displayed in the Active Value box is the parameter (Input Voltage) in use. Alternate values are displayed in keys below the Active Value box.

Press the correct voltage key, then press **Write** to load the selected value to the UPS memory and return to the original parameter screen.

Example 2



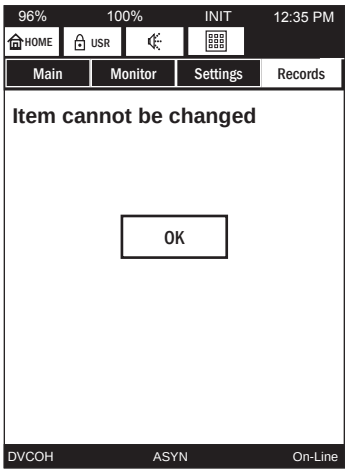
Example 2: Some parameters can be any of a range of values.

The VIUV (Voltage In Under Voltage) Hysterisus can vary over a range. Press the “Rated Vin” parameter listing and enter the correct value in the Active Value box using the standard alphanumeric keypad.

Use the back arrow to delete an incorrect keystroke.

After changing the parameter value, press **Write** to write the entered value to the UPS memory.

Example 3



Example 3: Some parameters are informational, some can be changed by the user, and others can only be changed by a higher security access.

If a parameter cannot be changed under the current security access level, selecting the parameter for change will generate the message **“Item cannot be changed”**.

Press **OK** to return to the original display.

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17.2 Settings Parameters

Appendix B lists all parameters that can be accessed under the MONITOR tab of the touchscreen display.

Depending on the access level, parameters may be either read and written to (e.g.), read only, or hidden from view except at a higher access level.

Parameters are displayed at higher access levels and not a lower access levels in order to reduce operator information overload.

The security levels are, from lowest to highest level:

Access Level	**Sec. Abbreviation**
User	USR
Administrator	ADM
*Dealer**	*DLR*
*Service/QC**	*SVC*
*Factory**	*ENG*

* DLR, SVC, and ENG are restricted to factory and factory authorized service providers only.

The table headings are:

- **Cmd ID** - Command ID number. A three digit number between 000 and 999. Not all numbers have an associated parameter.
- **Description on LCD** - Display text, often abbreviated.
- **Brief Description** - Brief description of the function of the parameter.
- **Location Map - Tab/Blk** - Gives the menu location for the parameter by Tab and Block.
  The tabs are Main, Monitor, Settings, Records.
  E.g. Cmd 501 (Battery Voltage can be viewed under the Monitor tab, in the BATT block)
  UPS Status is displayed in the display header Status field.
  UPS Faults and Warnings are shown in the display footer, at the bottom of the display.
- **Example** - Shows an example of the parameter displayed on the touchscreen.
- **Rqd Security Level to Change/By** - The required security level to change a parameters value or setting: User, Administrator, Distributor.

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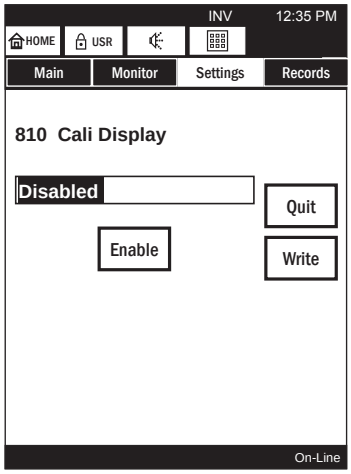
17.3 Recalibrate the Touchscreen

The touchscreen on the UPS is shipped from the factory already calibrated. However, at some point the touchscreen calibration may need to be refreshed so that the active portion of the screen matches the underlying graphics.

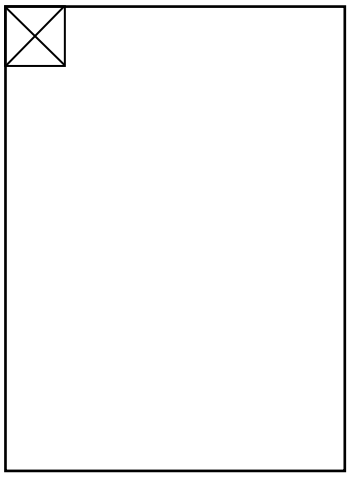
Recalibrate the Touchscreen as follows:

1. Press the **Settings** tab.
2. Press the **Disp/Reye** key.
3. Page forward to the second page and press the line:
   810 Cali Display
4. The settings display will show the Cali Display screen.
5. Press the **Enable** key.
6. Press the **Write** key. (This will write the subsequent calibration values to the Control board.)
7. The display will switch to the CALIBRATION SCREEN shown below.
8. Gently press a stylus, or similar fine pointed tool, to the center of the X located at the top left-hand side of the display.
9. As soon as the information is read, a second X will be displayed at the top right-hand of the display. Repeat Step 7.
10. Repeat Step 7 for X displayed at the lower right-hand side of the display.
11. Repeat Step 7 for the X displayed at the lower left-hand side of the display.
12. After completing Step 10, the display will return to the *Cali Display* screen. Press the **Quit** key.

The touchscreen has been successfully recalibrated and the resulting values stored on the Control PCB.



Cali Display SCREEN


CALIBRATION SCREEN

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18. Communication Interfaces

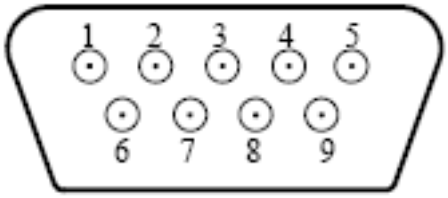
18.1 Remote Contacts

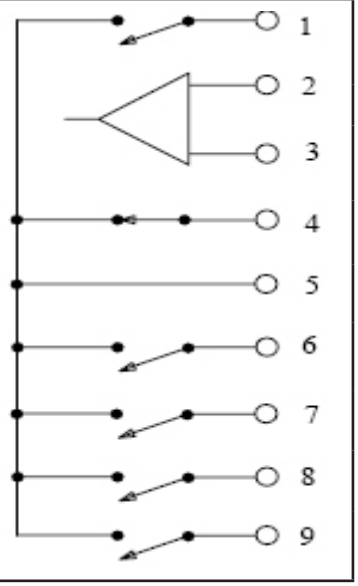
The remote contacts interface is provided as a set of solid state switching devices. The switches are available through a DB9 male connector on the rear of the UPS. The following chart shows the pin assignment for each signal.

MAXIMUM CURRENT CARRYING CAPACITY OF THE SWITCH

Voltage	Current
48 Vdc peak	70 mA peak
30 Vac rms (42 Vac peak)	50 mA rms (70 mA peak)

DB9 MALE CONNECTOR OUTLINE (FACING CONNECTOR)



Pin	Signal Function	Logic	In the UPS
1	Fault Signal	Closed when fault detected	
2	UPS stop common	Backup stop when the level changes from Low (-3 to -15 V) to High (+3 to +15 V)	
3	UPS stop signal input		
4	Normal input power supply	Closed with normal supply power	
5	Signal common	Common signal return	
6	Bypass operation	Closed during bypass operation	
7	Battery voltage drop	Closed at voltage drop	
8	UPS operation	Closed during inverter operation	
9	Power failure signal	Closed at power failure	

NOTE: Pin switches are shown in their inactive states. For example, if battery voltage is low, pin 7 will be connected to pin 5.

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18.2 UPS LAN Shutdown Signal Operation

When the UPS stop signal is sent to the UPS through pin 2 and 3 of the external contact interface, it is possible to automatically reset the following operating systems (OS), which can automatically implement the shutdown function and restart the operation: **Windows NT, IBM OS/2 LAN server, LANtastic**

Parameter 646 – UPS Shutdown by LAN Input Signal Enabled/Disabled

Parameter 647 – UPS Shutdown by LAN Signal Permitted Time Window (Adjustable)

With the **UPS Shutdown by LAN Signal** function enabled, when line power fails and the UPS goes to backup the LAN will shutdown even if the UPS returns to normal mode during the shutdown process.

LAN shutdown can take several minutes. The **UPS Shutdown by LAN Signal** function has a companion **UPS Shutdown by LAN Signal Permitted Time Window** parameter that can be set to allow sufficient time to complete the LAN shutdown process (default: 10 minutes) even if line power is restored during LAN shutdown.

LAN shutdown is treated as a restart after battery shutdown. The restart of the LAN will be determined by the **Restart After Battery Shutdown** timer.

Connect only the UPS stop signal to the external contact interface for automatic processing so that the UPS output will not be turned off by mistake.

If the computer is started/restarted within 10 minutes after the recovery from a power failure, the power supply may be reset while the computer is restarting.

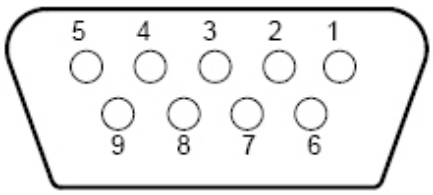
18.3 RS-232C

The RS232C port can be used by authorized service personnel. The port is provided using a DB9 female connector located on the rear of the UPS. For reference, the pinout of the connector is illustrated below.

RS-232C CONNECTOR PIN ASSIGNMENT

Pin	I/O	Symbol	Description
1	This pin is not used		
2	Input	RXD	Receive data
3	Output	TXD	Transmit data
4	Output	DTR	Data terminal ready
5	-	SG	Signal ground
6	Input	DSR	Data set ready
7	Output	RTS	Request to send
8	Input	CTS	Clear to send
9	This pin is not used		

DB9 FEMALE CONNECTOR OUTLINE (FACING CONNECTOR)



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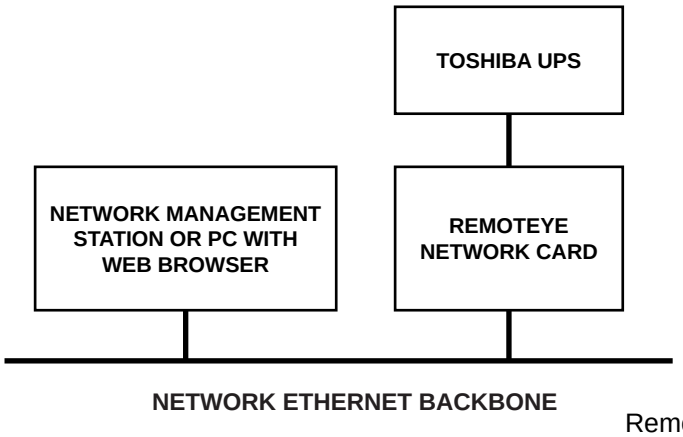
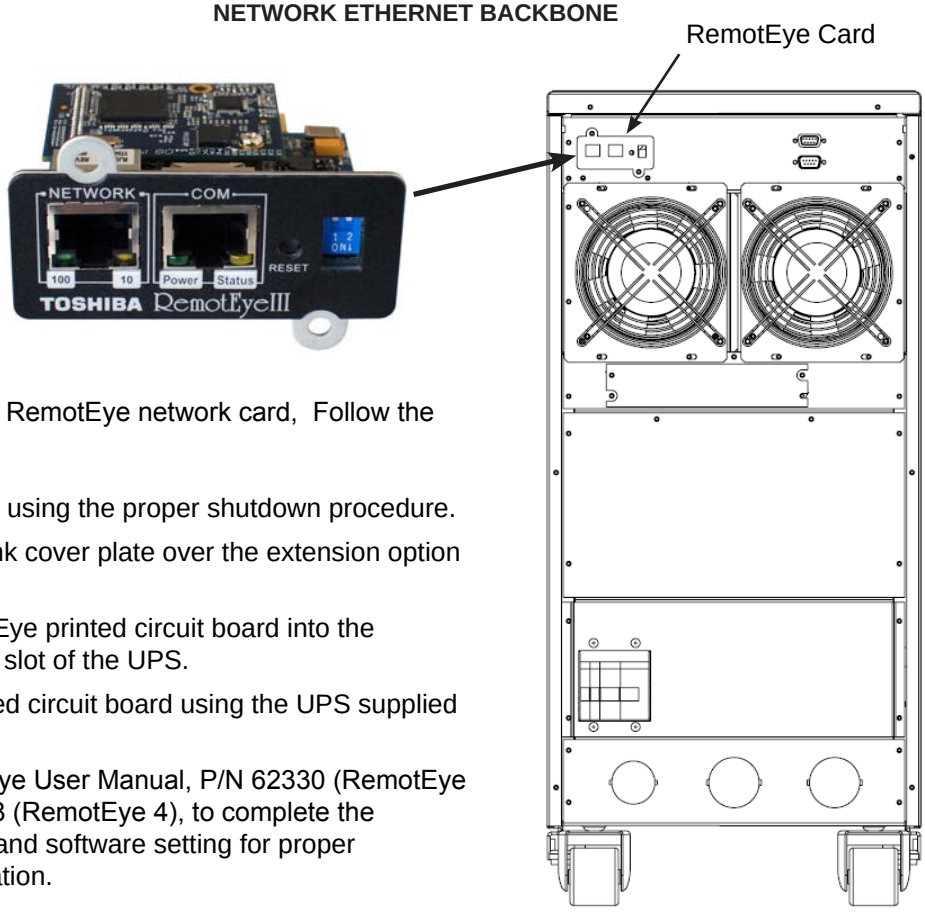
18.4 RemotEye Network Card

The RemotEye III and RemotEye 4 are network communication cards for the Toshiba UPS. The RemotEye communications card is optional for the 1600XP, and standard with the 1600XPi. Both the RemotEye III and RemotEye 4 will work in either model.

This card slides into a slot located on the back side (See illustration) of the UPS. The card provides a network, or LAN-based communication interface for the UPS. When installed, the UPS can be managed remotely using the common SNMP and HTTP web-based network protocols. The following diagram shows the flow of the Network Management Station.





REMOTEYE NETWORK CARD LOCATION

18.4.1 To install the RemotEye network card, Follow the steps below:

1. Turn the UPS off using the proper shutdown procedure.
2. Remove the blank cover plate over the extension option slot.
3. Slide the RemotEye printed circuit board into the extension option slot of the UPS.
4. Secure the printed circuit board using the UPS supplied screws.
5. See the RemotEye User Manual, P/N 62330 (RemotEye III), or P/N 90988 (RemotEye 4), to complete the hardware setup and software setting for proper RemotEye operation.

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18.5 (Optional) EMD

The **Environmental Monitoring Device (EMD)** is a monitoring device that provides real time comprehensive remote monitoring of environment temperature, environment humidity and other conditions via the RemotEye Network Card. The EMD also provides two user-defined dry contacts for additional monitoring. These dry contacts can be used with devices that provide normally-open or normally-closed results, such as door sensors, smoke detectors, motion detectors, and liquid detectors.

ENVIRONMENTAL MONITORING MODULE (EMD)

Intrusion Sensor

Liquid Sensor

Motion Sensor

Smoke Detector

EMD SENSORS

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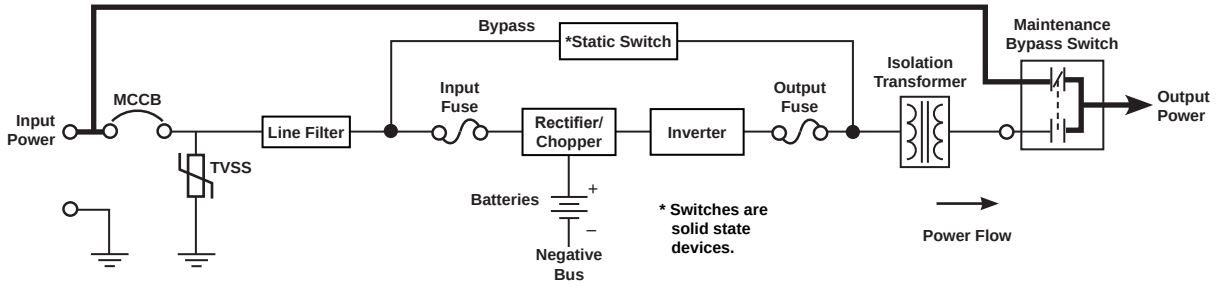
19. Optional MB (Maintenance Bypass) Units

The following illustration shows the circuit power flow when the UPS is operating in the optional Maintenance Bypass mode. The input jumper on the UPS must be set for 240 VAC.

NOTICE

Ensure the UPS is in Static Bypass before switching the unit from UPS to Maintenance Bypass mode or from Maintenance Bypass to UPS mode. Failure to do so could result in damage to the maintenance bypass switch or the UPS.

This Maintenance Bypass unit can only be used for 240 V applications. Ensure the UPS voltage selector jumper is set to 240 V. See page 12 for the correct 240 V setting.



POWER FLOW IN MAINTENANCE BYPASS MODE FOR ALL MODELS

19.1 Internal Maintenance Bypass

The optional internal maintenance bypass is mounted on the rear of the UPS.

Internal Maintenance Bypass Instructions:

From Inverter Mode to Maintenance Bypass Mode

1. Turn the RUN/STOP switch to the STOP position on the UPS.
2. Turn the Maintenance Bypass Switch to the Bypass position. The Bypass LED should be ON and the UPS LED should be OFF. The LEDs are next to the Maintenance Bypass switch, on the back of the UPS.
3. Turn the MCCB input breaker on the UPS to the OFF position. The UPS is now operating in Maintenance Bypass Mode.

From Maintenance Bypass Mode to Inverter Mode

1. Turn the MCCB input breaker on the UPS to the ON position.
2. Turn the Maintenance Bypass switch to the UPS position. The UPS LED should be ON and the Bypass LED OFF.
3. Turn the RUN/STOP switch to the RUN position on the UPS. The UPS is now operating in the UPS Mode.

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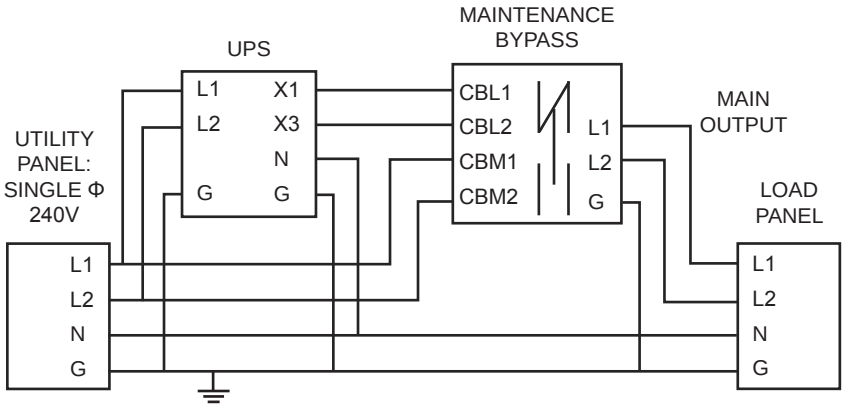
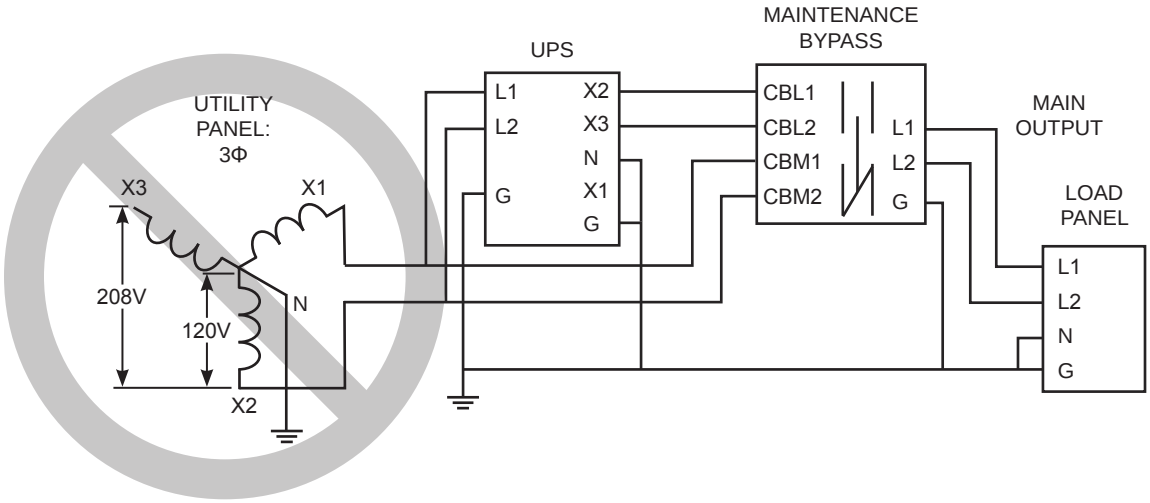
19.2 (Optional) External Maintenance Bypass

Wiring
The following connections must be made to the Utility Panel and the Load Panel. The Main UPS output is located on the terminal block on the back of the UPS. (TB-4(X1) and TB-7(X3) 240 VAC.)



See the application instructions included with the External Maintenance Bypass Unit for wiring details.

Do NOT use two legs of a three phase, 208/120V utility to feed the 1600XP/XPi, as shown below, if an external maintenance bypass is being used. The phase shift between the output of the UPS and the utility feed to the bypass could interrupt the power to to load.



DO NOT USE 3-PHASE INPUT WHEN USING AN EXTERNAL MAINTENANCE BYPASS

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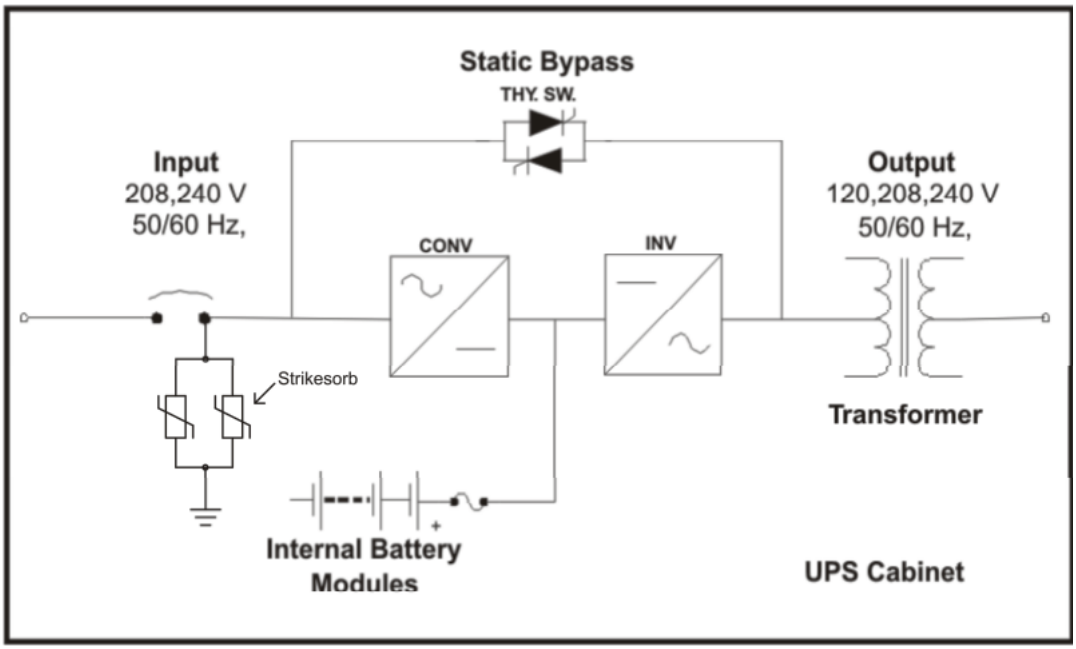
20. Optional TVSS (Transient Voltage Surge Suppressor)

All models of the 1600XP and 1600XPi UPS ending in -TVS are equipped with a TVSS (Transient Voltage Surge Suppressor. The TVSS is mounted on the back of the UPS and is factory wired to the input as shown below.



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21. External Battery Cabinet Connections

Optional external battery cabinets can be used to extend the backup time of the UPS beyond that available with the internal batteries. The external battery cabinets connect to the UPS via Anderson-style connectors.

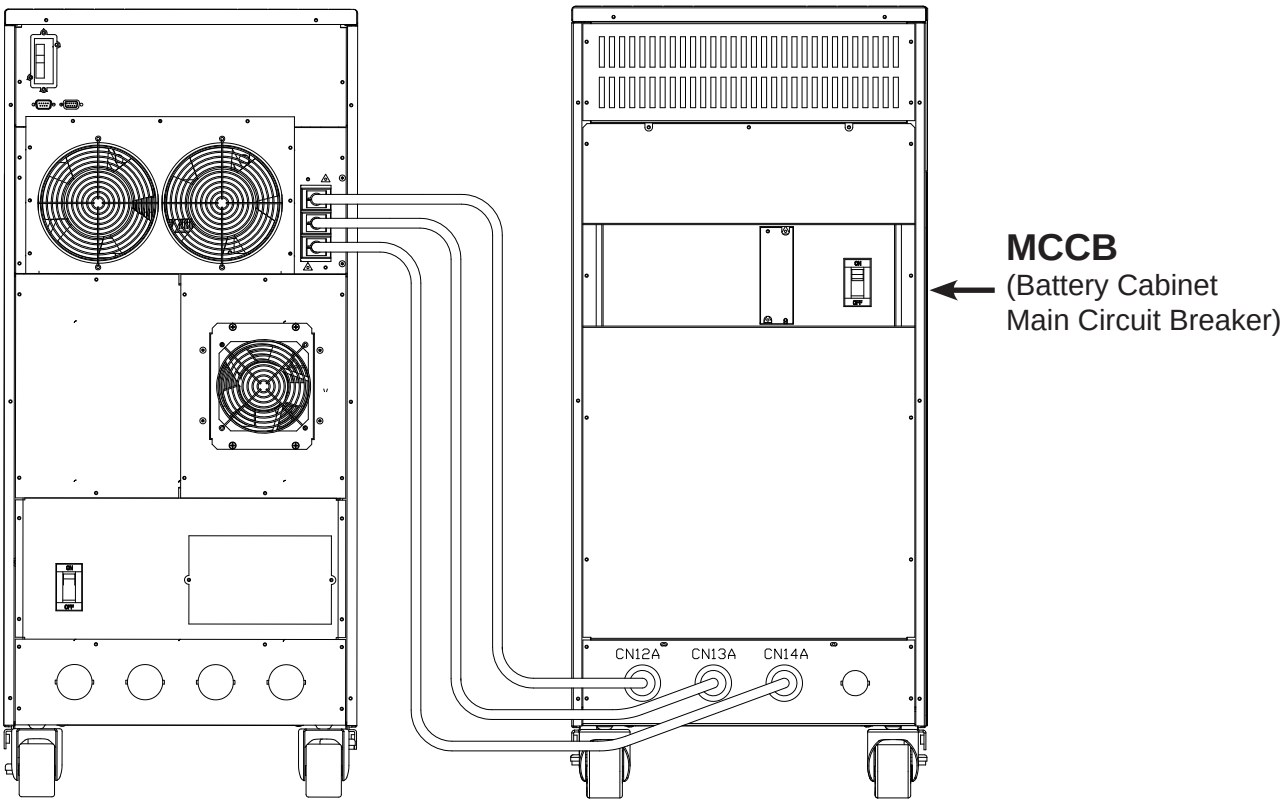
Battery cabinets are available in either matching or non-matching styles. All 1600XP/1600XPi battery cabinets are equipped with Anderson-style keyed connectors that plug into the 1600XP/1600XPi UPS.

Non-matching battery cabinets also come with an additional separate power cord for secondary recharging of the battery cabinet.

For UPS and Matching battery cabinet runtimes, see Appendix D.

For Matching battery cabinet dimensions and weights, see Appendix E.

For Non-matching battery cabinet dimensions and runtimes, see Appendix F.



UPS Model	Battery Cabinet MCCB Capacity
3.6, 6 kVA	50 A
8, 10, 14, 18, 22 kVA	100 A

See the applicable battery cabinet manual for additional details.

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22. Optional Receptacle Panel Installation Instructions

These are the instructions for installing the optional Modular Output Receptacle Panels for the 1600XP/ 1600XPi Series UPS. These instructions apply to all UH3-RP-XXX panel options.

WARNING: The work outlined in these instructions is to be performed only on a completely de-energized UPS system.

Refer to Figure 1 for location of UPS referenced material. Refer to Figure 2 for material referring to the receptacle panel module. There are different panels available depending on the UPS typeform.

Step 1: Remove the modular receptacle panel cover plate.
On the rear of the UPS, locate the cover plate for the receptacle panel module interface (See Figure 1).
Remove the 6 mounting screws.
Remove the cover plate. A square-shaped plug will be exposed.

Step 2: Snap-In Output Receptacle modular panel.
Carefully mate the square-shaped connector on the UPS to its matching counter part on the rear of the modular panel.

Step 3: Mount the receptacle panel.
Attach the screws removed from the cover plate through the mounting holes of the receptacle panels and back into the UPS mounting points.

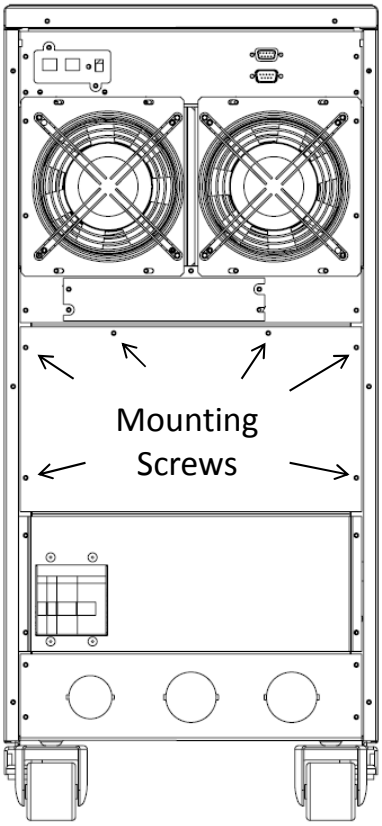

Figure 1

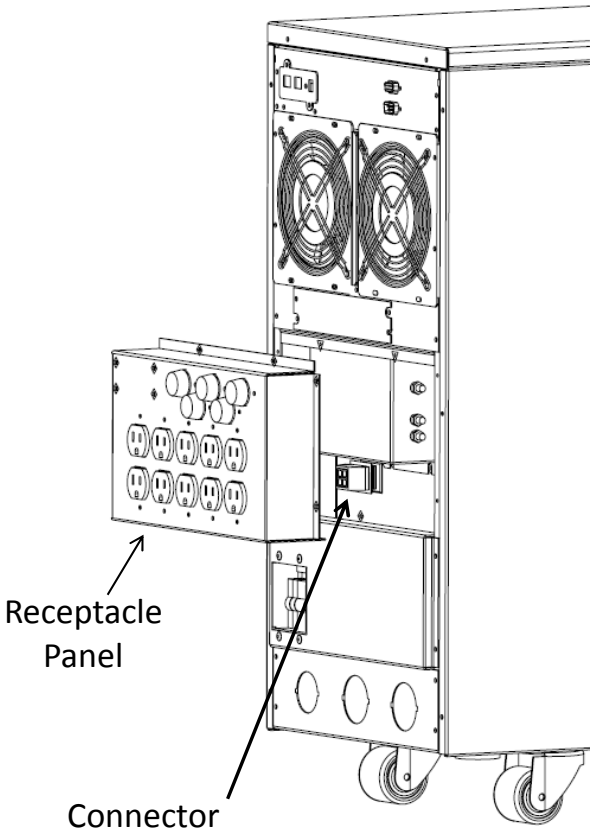

Figure 2

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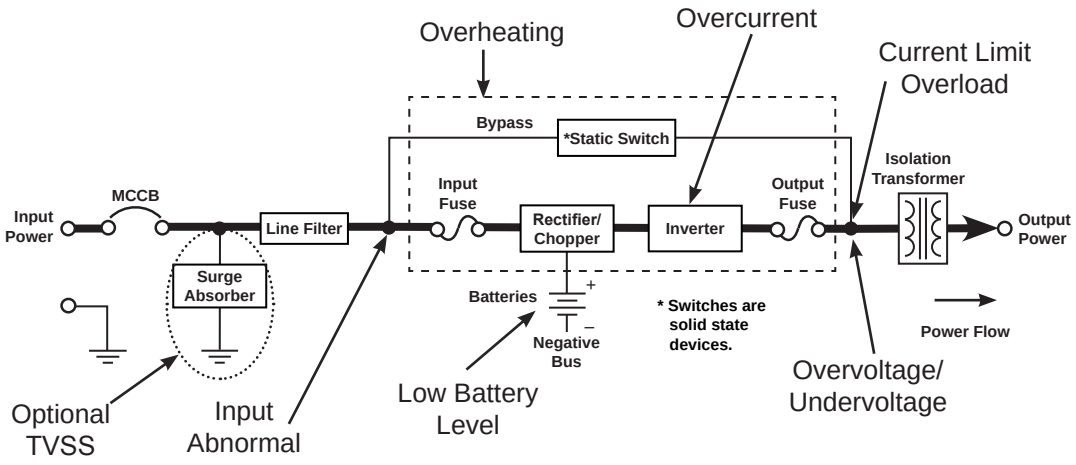
23. UPS Protection System

23.1 UPS Protection Devices

The following schematic shows the electrical locations of the protection devices on the UPS.



23.2 UPS Protection Devices Fault Response

The following charts show the UPS response to common faults.

UPS FAULT PROTECTION FUNCTIONS

Protection Item	Output Overvoltage	Output Undervoltage	Output Overload
LCD Message	**VOOV**	**VOUV**	**OL110**
Cause	Control malfunction; EEPROM error	Control malfunction; Fuse opened; Load issue	Loading that exceeds design parameters
Operation Mode After Fault	Bypass operation – Chopper and inverter are stopped		Inverter OL: Transfer to bypass; Bypass OL: Inverter, chopper stopped
Audible Alarm	Yes – Continuous buzzer		See Audible Alarm Functions on page 33
Visible Alarm	Red Fault LED on		Inverter OL: Fault lamp off Bypass OL: Fault lamp on
Relay Contact Alarm	Fault relay closed Bypass relay closed		Fault relay open; Inverter OL: Bypass relay closed Bypass OL: Bypass relay open
Auto-retransfer	No		Inverter OL: Yes if bypass is OK Bypass OL: No

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UPS FAULT PROTECTION FUNCTIONS (CONT'D)

Protection Item	Ambient Overheat	DC Circuit Overvoltage	DC Circuit Overcurrent
LCD Message	AOH	DCOV	DCOC
Cause	Fan failure; High internal ambient temperature	Chopper malfunction	Inverter/chopper fault
Operation Mode After Fault	Shutdown – No output	Bypass operation – Chopper and inverter are stopped Inverter OL – Transfer to bypass	
Audible Alarm	Yes – Continuous buzzer		
Visible Alarm	Red Fault LED on		
Relay Contact Alarm	Fault relay closed Bypass relay closed		
Auto-retransfer	No		

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23.3 System Fault Messages

A Fault message is generated when either a fault condition occurs, or a warning condition occurs three times within ten minutes. The table below shows the possible fault messages and what actions need be taken.

If the input voltage is normal when the fault occurs then the UPS will switch immediately to the bypass mode to continuously feed power to the load.

If the fault condition occurs while the input power is abnormal and the UPS is in Bypass mode the UPS will shut down the output to prevent load equipment damage.

When a Fault condition exists, the red LED on the UPS display panel will illuminate until the fault is cleared.

All faults are recorded. The fault status can cleared by cycling power (turn off, then turn on) after the problem has been fixed.

Display	Recorded	Meaning	Action
BYPOH	Y	Bypass Overheat – Overheating condition occurred.	Check unit for blocked or in-operable fan. Lower ambient temperature if it is greater than 104 °F (40 °C). Bypass operation will also cease if overheat condition is not corrected within 1 hr. of inverter shutdown. Try restarting. If condition reoccurs plan for total shutdown and call for service.
BYPOL	Y	Bypass Overload – UPS is overloaded.	Shut down excess equipment to reduce load.
CHRGOV	Y	Charger Overvoltage – Charger overvoltage condition occurred.	UPS is faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.
CLMT	Y	Current Limit – Load on UPS output exceeds unit specifications.	Reduce load on UPS output.
DCIB	Y	DC Bus Imbalance – DC voltage imbalance occurred.	Possible causes are UPS fault are connection of half-wave rectifier load. Check load and try restarting. If condition persists,call Toshiba for service.
DCOC	Y	DC Bus Overcurrent – DC overcurrent condition occurred.	UPS is faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.
DCOV	Y	DC Bus Overvoltage – DC overvoltage condition occurred.	UPS is faulty, input wiring error, input overvoltage or connection of a motor load. Try restarting. If condition persists call Toshiba for service.
DCUVBS	Y	DC Bus Undervoltage during Boostup Mode – DC Bus undervoltage condition occurred.	UPS is faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.
DCUVC	Y	DC Bus Undervoltage During Charging Mode – DC Bus undervoltage condition occurred.	UPS is faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.
DVCOH	Y	Device Overheat – Overheating condition occurred.	Reduce equipment load to 100% or less and try restarting.
EXTBC1	N	1. BC1 Battery String 1, 2, or 3 Loose HCT Connection 2. BC1 Over Voltage Fault 3. BC1 Over Current Fault	• Call Toshiba for Service. • Call Toshiba for Service • Call Toshiba for Service

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Display	Recorded	Meaning	Action
EXTBC2	N	1. BC2 Battery String 1, 2, or 3 Loose HCT Connection 2. BC2 Over Voltage Fault 3. BC2 Over Current Fault	• Call Toshiba for Service. • Call Toshiba for Service • Call Toshiba for Service
FSOPEN	Y	Fuse Open.	Replace fuse.
INVOLNR	Y	Inverter Overload (Not Resettable) – Output overload condition occurred.	Reduce equipment load to 100% or less and manually restart the UPS.
INVOLR	Y	Inverter Overload (Resettable) – Output overload condition occurred.	Reduce equipment load to 100% or less, the UPS will retransfer.
OOC	Y	Output Overcurrent – UPS is overloaded.	Shut down excess equipment to reduce load.
VOOV	Y	Output Overvoltage – Output overvoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.
VOUV	Y	Output Undervoltage – Output undervoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call Toshiba for service.

23.4 System Warning Messages

Warning messages are generated when a noncritical abnormal operating condition occurs. The following tables shows possible messages and their meaning.

When a Warning condition exists, the amber LED on the UPS display panel will flash for the duration of the Warning condition.

All warnings will clear after the appropriate action has been taken.

Display	Recorded	Meaning	Action
AOH	Y	Ambient Overheat – The unit is overheated (warning is given when the internal temperature reaches and exceeds 50° C ambient).	Check to see if the ambient temperature is greater than 104 °F (40 °C) If so, turn on air conditioning and check the ventilation fan at the back of the unit for operation or obstructions. Otherwise, shut down the unit and call Toshiba for service.
ASYN	N	Asynchronous mode – Input and output frequency are different. Bypass is disabled.	No Action Needed.
BDEPL	N	Battery Depleted – Battery not within specifications.	Call Toshiba for service.
BLFE	Y	Battery Lifetime End – Batteries at end of life.	Have batteries replaced immediately.
BLFN	Y	Battery Lifetime Near End – Batteries are nearing the end of their expected lifetime.	Call Toshiba for service.

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Display	Recorded	Meaning	Action
BOH	Y	Battery Overheat – Battery not within specifications.	Call Toshiba for service.
BRPL	Y	Replace Battery – Battery at end of life expectancy.	Replace battery immediately.
BSDV	N	Battery Shutdown Voltage – Battery is discharged down to minimum level.	UPS will shut down. Secure critical loads until power can be restored.
BTSTFL	N	Battery Test Failed – Battery not within specifications.	Call Toshiba for service.
BYPOV	N	Bypass Overvoltage – Bypass voltage exceeds UPS specifications.	UPS in Bypass Mode: UPS turns off bypass power to the load until bypass power returns to normal. Check bypass power.
BYPUV	N	Bypass Undervoltage – Bypass voltage less than UPS specifications.	UPS in Bypass Mode: UPS turns off bypass power to the load until bypass power returns to normal. Check bypass power.
CALL	Y	Service Call Required – Inspection of the unit is advised.	Have inspection/service performed.
CHRGOV	Y	Charger Overvoltage – Battery Charger not within specifications.	Call Toshiba for service.
CLMT	N	Current Limit – UPS not within specifications.	Call Toshiba for service.
DCER	Y	Display Cable Error – Display cable is disconnected.	Connect the display cable.
DCANERR	N	Communication Error between Display and Main Controllers.	Call Toshiba for service.
EXTBC1	N	1. BC1 Battery String 1, 2, or 3 Disconnected 2. BC1 Over Temperature 3. BC1 Lost Communications with UPS	• Recover without power cycle - Must Manually Reset. • Reduce Load on BC, call factory Toshiba for Service • Call Toshiba for Service
EXTBC2	N	1. BC2 Battery String 1, 2, or 3 Disconnected 2. BC2 Over Temperature 3. BC2 Lost Communications with UPS	• Recover without power cycle - Must Manually Reset. • Reduce Load on BC, call Toshiba for Service • Call Toshiba for Service
FBYPER	N	Bypass Frequency Error – Input frequency outside of UPS specifications.	UPS in Bypass Mode: UPS turns off bypass power to the load until bypass frequency returns to normal. Check bypass frequency.
FIER	N	Input Frequency Error – Input frequency outside of 45 – 65 Hz range.	UPS in On-Line Mode: UPS switches to BACKUP mode until Input Frequency returns to normal.
LB	N	Low Battery – The battery level has dropped low (about 90% or less) during operation. Continued operation in this mode will deplete battery and cause output shut down.	Immediately shut down the load equipment in an orderly fashion and then press the STOP key.

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Display	Recorded	Meaning	Action
OL110	N	Overload – UPS is overloaded (110% and above) Unit will switch to bypass operation or shut down if no action is taken.	Shut down excess equipment to reduce load.
REYEERR	N	Communication Error between RemotEye and UPS.	Ensure RemotEye is connected to UPS. Call Toshiba for service.
RS232ERR	N	Communication Error at Service Port.	Call Toshiba for service.
REYEUER	N	Communication Error at LAN.	Call Toshiba for service.
VDCUVBT	N	DC Bus Undervoltage During Battery Test.	Call Toshiba for service.
VIOV	N	Input Overvoltage – Input voltage exceeds UPS specifications.	UPS in On-Line Mode: UPS switches to BACKUP mode until Input Voltage returns to normal. Check bypass power.
VIUV	N	Input Undervoltage – Input voltage less than UPS specifications.	UPS in On-Line Mode: UPS switches to BACKUP mode until Input Voltage returns to normal. Check bypass power.

23.5 System Mode Messages

A UPS Mode message is generated when the UPS changes operating mode. The following tables list the possible operating modes for the UPS.

Display	Meaning
Backup	Backup – Power comes from other than input.
BattTest	Battery Test – Battery test in progress.
Bypass	Bypass – UPS is offline, power is being provided directly from UPS input.
On–Line	On-Line – Input converter and inverter are running (Double conversion mode).
Shutdown	Shutdown – No output, DC Bus is charged through Softstart Resistor.
Startup	Startup – UPS is starting up.

23.6 System Status Messages

A UPS Status message is generated when the UPS changes its status (from inverter to bypass mode, for example). The table below shows the possible Status messages and their meaning.

Display	Meaning	Action
BYP	Bypass mode – Power is supplied by UPS input.	No action needed.
CHRGERR	Charger Error – Charger overvoltage error.	Call Toshiba for service.
DLYST	Delay Start – UPS is counting down prior to startup.	No action needed.
EE1ST	EEPROM is loaded with default values.	No action needed.
EE2RAERR	EEPROM to RAM loading Error.	Call Toshiba for service.

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Display	Meaning	Action
EEUPERR	EEPROM updating Error.	Call Toshiba for service.
EPO	EPO circuit is active.	Reset EPO switch to start.
FIERRST	Frequency Input Error Start – Input frequency could not be detected and UPS starts up with default EEPROM setup.	Ensure correct input frequency is selected in UPS settings.
FLT	A fault has occurred.	See Fault records.
FWUPERR	Firmware Update Error.	Call Toshiba for service.
INIT	Initialization – UPS is inatilizing.	No action needed.
INV	Inverter mode.	Inverter is running (it can be On-Line, Battery Test, or Backup)
LANSD	UPS goes to Shutdown triggered from customer supplied LAN SD circuit.	Deactivate LAN shutdown signal to reset.
LB	Low Battery – The battery level has dropped low (about 90% or less) during operation. Continued operation in this mode will deplete battery and cause output shut down.	Immediately shut down the load equipment in an orderly fashion and then press the STOP key.
PFAIL	Input power failure.	No action needed.
RMTSD	Remote shutdown occurred.	Disconnect LAN signal to reset.
RO2EEERR	ROM to EE Loading Error.	Call Toshiba for service.
SYNC	Synchronous mode.	Input and output are synchronized.
TIMEDSD	UPS is counting down prior to shutdown.	Immediately shut down the load equipment in an orderly fashion and then press the STOP key.
WRN	A warning has occurred.	See Warning record.

24. Preventive Maintenance/Parts Replacement

24.1 Preventive Maintenance

Toshiba 1600XP/1600XPi Series of uninterruptible power systems have been designed to provide years of trouble-free operation requiring a minimum of preventive maintenance.

The best preventive measure that the UPS user can take is to keep the area around the unit, particularly the air inlet vents, clean and free of moisture and dust accumulations. If the atmosphere of the installation site is very dusty, use a vacuum cleaner to periodically remove dust accumulations around and from the unit.

⚠ CAUTION

Only a qualified Toshiba representative should be allowed to perform any routine maintenance or service on this equipment other than those preventive maintenance details which are described directly above this caution.

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24.2 Cleaning the Touchscreen

The touchscreen display is covered with a protective Teflon coating. It should be cleaned with a clean, damp cotton cloth to avoid scratching the coating.

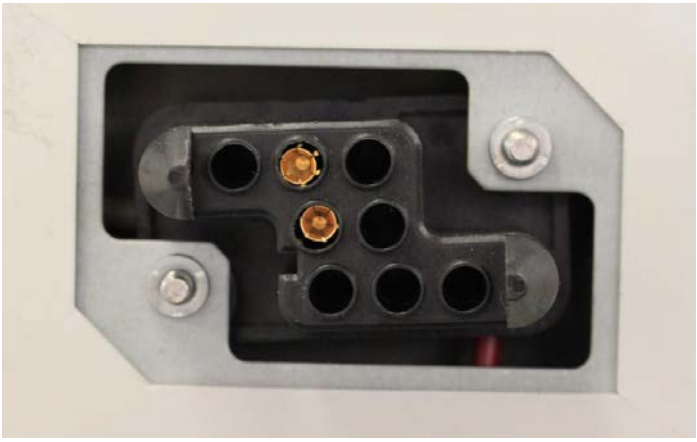
24.3 Battery Pack Replacement

The 1600XP/1600XPi come equipped with a set of internal backup batteries packaged in sets of 6 batteries per battery pack. The two battery packs, P/N 51896, and P/N 60995 are outwardly similar but distinctly different.

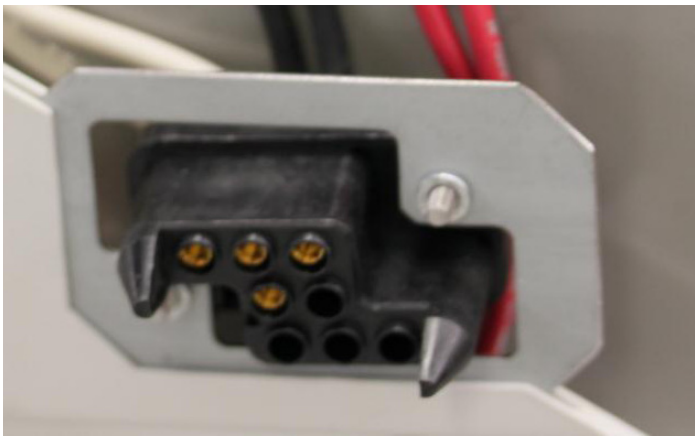
NOTICE

Ensure the 1600XP/1600XPi battery packs are replaced with battery packs of the same part number. Failure to do so may cause unexpected loss of backup power.

Battery Tray Plug for:
3.6, 6, 8, 14, and 18 kVA
P/N 51896-FS



Battery Tray Plug for:
10 and 22 kVA
P/N 60995-FS
(Dual conductors because of higher battery pack discharge current)



1600XP/1600XPI BATTERY TRAY PLUG DIFFERENCES

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The 1600XP/1600XPi come equipped with a set of internal backup batteries packaged in sets of 6 batteries per battery pack. See **Appendix A: Specifications** for the number of battery packs per UPS model.

HOT SWAPPABLE: The battery packs can be replaced while the UPS is in On-Line or Bypass modes without removing power from the critical loads.

⚠ CAUTION

If a power failure occurs as the battery pack is being removed/inserted or occurs during the period batteries are out of the circuit, the unit will try to go to Backup (without battery) and would thus drop the load. It would also arc/spark between the battery and chassis connections if going to Backup as the tray is pulled.

To perform a hot swap of the battery packs:

1. Open the front door of the 1600XP/XPi.
2. Loosen the battery retaining plate screws and remove the battery pack retaining plate(s).

⚠ CAUTION

Each battery pack weighs approximately 40 lb (18 kg).

Dropping or uncontrolled handling of the battery pack may result in personal injury or damage to the UPS or battery pack.

Use two hand or two person lift to handle each battery pack. Maintain horizontal orientation of the battery pack with setting it down.

3. Slowly draw out each battery pack half-way, then support the bottom of the pack as the pack is drawn out of it's receptacle.
4. Place the old battery pack aside.
5. Lift the new battery pack using the same technique described above to slide the battery pack half way into the battery pack receptacle.

   Ensure the battery pack is oriented right-side up.
6. Slowly slide the battery pack the rest of the way into the receptacle.

   6.1 If oriented correctly, the battery pack will slide all the way into the battery pack receptacle, and a faint but audible click can be heard when the rear connectors mate.

   6.2 If the battery pack does not slide smoothly back completely into the receptacle, remove it and verify the battery pack is not upside down.

   6.3 Notify the factory if the battery pack still will not fully seat in the receptacle, and a cause cannot be determined.
7. Repeat steps 3-6 for remaining battery packs.
8. Reinstall battery pack retaining plates.
9. Close the front door.

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24.4 Part Replacement

The following list shows recommended intervals for periodic replacement of certain UPS parts:

1. Aluminum electrolytic capacitors: Replace once every 5 years.
2. Fuses: Replace once every 7 years.
3. Cooling fan: When operated in an ambient temperature of 86 °F (30 °C) to 104 °F (40° C), replace every 3.5 years. When operated in an ambient temperature of less than 86 °F (30 °C) , replace every 5 years.

   NOTE: The cooling fans are not hot swappable. Remove all power from the UPS before replacing the cooling fans.

   (Open the UPS main circuit breaker, disconnect external battery cabinets, and partially slide out the top battery trays enough to open the internal DC power circuit.)`
4. Batteries: In order to maintain system reliability, the UPS batteries should be replaced on a regular schedule. To ensure reliable operation, all of the batteries should be replaced at the same time. Use the following chart for replacement:

UPS BATTERY REPLACEMENT

BATT AMB TEMP*	AVERAGE LIFETIME
68 – 77 °F (20 – 25 °C)	Approximately 5 yrs.
86 °F (30 °C)	Approximately 3.5 yrs.
95 °F (35 °C)	Approximately 2.5 yrs.
104 °F (40 °C)	Approximately 1.8 yrs.
113 °F (45 °C)	Approximately 1.25 yrs.

* Continual operation at ambient temperatures above 25 °C will degrade the battery life.

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25. External Layouts/Dimensions/Shipping Weights

25.1 Electrical Conduit Knock-out Data

ELECTRICAL CONDUIT KNOCK-OUT HOLE SIZES (DIAMETER)						
3.6 kVA	**6 kVA**	**8 kVA**	**10 kVA**	**14 kVA**	**18 kVA**	**22 kVA**
3 ea. Back/ Bottom 1.125 in. (28.575 mm)	3 ea. Back/ Bottom 1.125 in. (43.69 mm)	2 ea. Back/ 3 ea. Bottom 1.75 in. (44.5 mm)	2 ea. Back/ 3 ea. Bottom 1.75 in. (44.5 mm)	4 ea. Back/ Bottom 1.75 in. (44.5 mm)	4 ea. Back/ Bottom 1.75 in. (44.5 mm)	4 ea. Back/ Bottom 1.75 in. (44.5 mm)
–	–	1 ea. Back 1.5 in. (38.1 mm)	1 ea. Back 1.5 in. (38.1 mm)	–	–	–

25.2 Unit and Shipping Weights

Model	Unit Weight		Shipping Weight	
	Pounds	**Kilograms**	**Pounds**	**Kilograms**
3.6 kVA	260	118	308	140
6 kVA	366	166	414	188
8 kVA	452	205	506	230
10 kVA	492	268	546	248
14 kVA	777	352	839	381
18 kVA	865	392	927	420
22 kVA	866	393	928	421

1. Subject to change without notice.

25.3 Dimensional Data

	DIMENSIONAL DATA						
	3.6 kVA	**6 kVA**	**8 kVA**	**10 kVA**	**14 kVA**	**18 kVA**	**22 kVA**
A	22.1 in. (561 mm)	27.5 in. (698 mm)	28.3 in. (719 mm)	28.3 in. (719 mm)	39.0 in. (991 mm)	39.0 in. (991 mm)	39.0 in. (991 mm)
B	10.0 in. (254 mm)	10.0 in. (254 mm)	13.0 in. (330 mm)	13.0 in. (330 mm)	17.5 in. (445 mm)	17.5 in. (445 mm)	17.5 in. (445 mm)
C	34.0 in. (863 mm)	34.0 in. (864 mm)	34.9 in. (886 mm)	34.9 in. (886 mm)	36.1 in. (917 mm)	36.1 in. (917 mm)	36.1 in. (917 mm)
D	19.7 in. (500 mm)	25.1 in. (637 mm)	25.7 in. (654 mm)	25.7 in. (654 mm)	35.6 in. (904 mm)	35.6 in. (904 mm)	35.6 in. (904 mm)
E	2.4 in. (61 mm)	2.4 in. (61 mm)	2.6 in. (65 mm)	2.6 in. (65 mm)	3.4 in. (87 mm)	3.4 in. (87 mm)	3.4 in. (87 mm)

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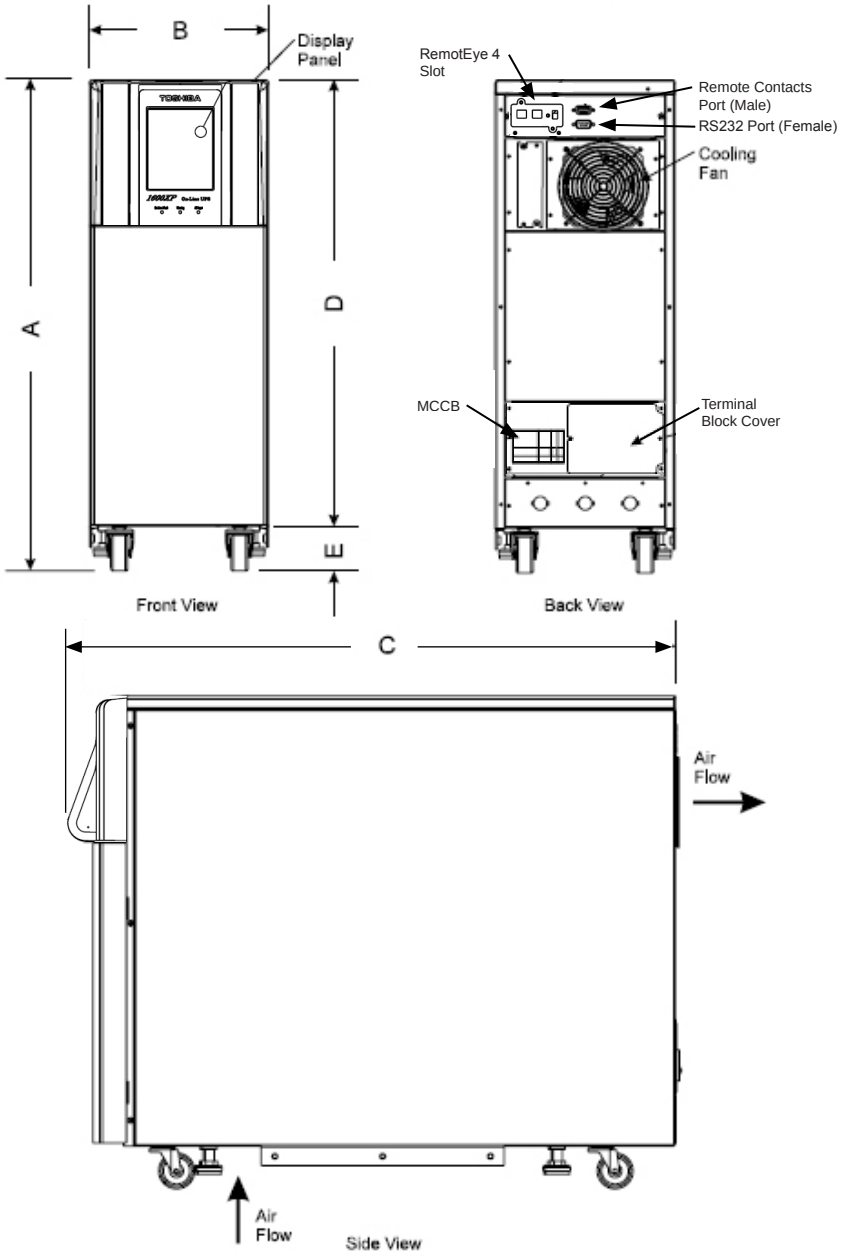
25.4 External Layout



External Layout for 3.6kVA and 6kVA units

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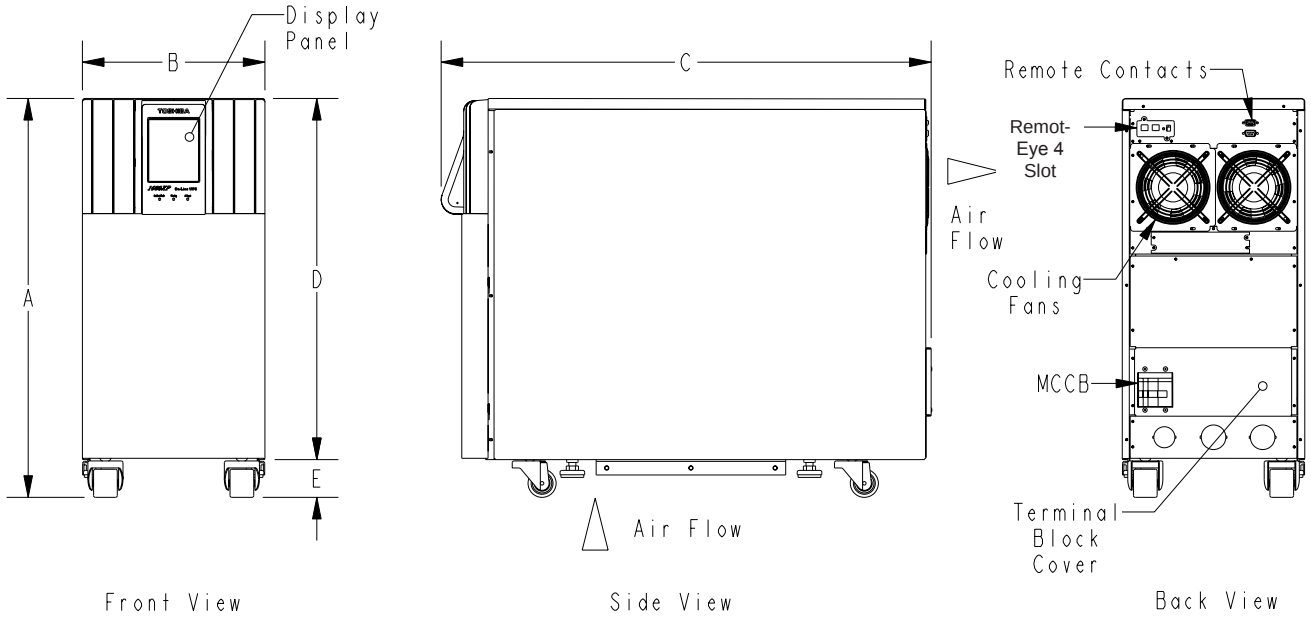
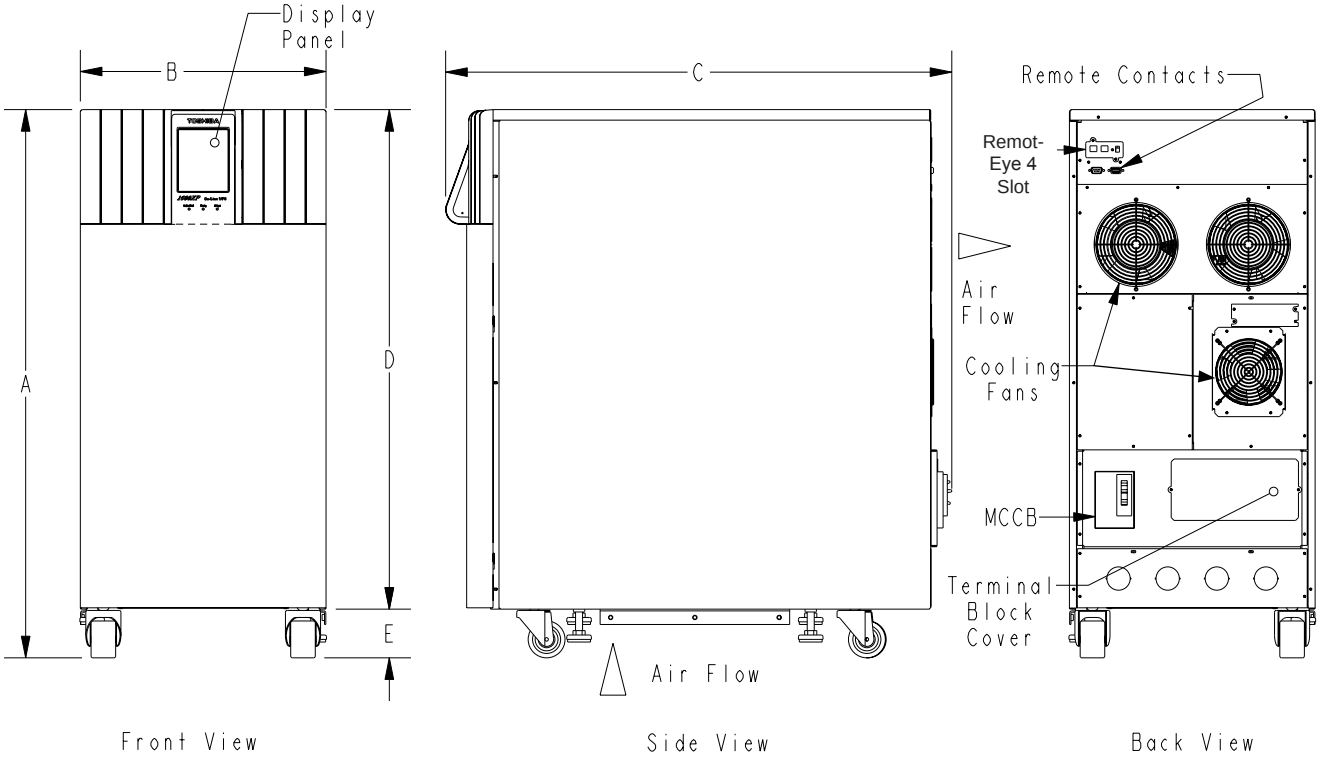


External Layout for 8kVA and 10kVA units



External Layout for 14kVA, 18kVA and 22kVA units

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Appendix A: 1600XP/1600XPi Specifications

Standard Model: 3.6 – 10 kVA

Unit (Capacity)	3.6kVA (3.1 kW) [1]	6 kVA (5.1 kW) [1]	8 kVA (6.8 kW) [1]	10 kVA (8.5 kW) [1]
General				
Typeform	UH3G2L036C61T H3BG2L036C61T	UH3G2L060C61T H3BG2L060C61T	UH3G2L080C61T H3BG2L080C61T	UH3G2L100C61T H3BG2L100C61T
Certifications	ANSI C62.41 (IEEE 587), UL 1778, CUL, CE, FCC Class A , NEC (NFPS-70), NEMA/ PE1-1993, OSHA, ASME, ISO 9001, ISO 14001:2004 , RoHS Compliant			
Input Characteristics				
Input Voltage[1]	Single-phase, 208/240 Vac, +10%[1,4] (to -30% at typical 70% load)			
Input Frequency	45 – 65 Hz (auto-sensing)			
Input Capacity	3.6 kVA	6 kVA	8.0 kVA	10 kVA
Input /(Max Input) Current @208V	17.9 (18.7) A	29.8 (31.1) A	38.9 (40.5) A	48.6 (50.2) A
Input/(Max. Input) Current @240V	15.5 (16.2) A	25.9 (27.0) A	33.7 (35.1) A	42.1 (43.5) A
Input Power Factor	0.98 Typical, 0.95 Minimum@ 100% Load			
Current THD (linear load)	< 5% total harmonic distortion			
Internal AC Input Breaker Rating	30 A/277 V	50 A/277 V	60 A/277 V	63 A/277 V
Battery Characteristics				
Battery Type	Valve Regulated Lead Acid, Flame Retardant			
Backup time, fully charged @ 0.7 power factor, 77 °F	8 min.[2]	8 min.[2]	7 min.[2]	7 min.[2]
Backup time, fully charged @ 0.85 power factor, 77 °F	7 min.[2]	7 min.[2]	7 min.[2]	5 min.[2]
Recharge Time	24 hr. (full), 12 hr. (90%) for internal batteries only[3]			
Battery Voltage (Nominal)	144 Vdc	216 Vdc	288 Vdc	
Output Characteristics				
Output Voltage	Single-phase, 240/208/120 V			
Output Voltage Regulation	= ± 3%			
Output Frequency	±0.5 Hz/1.0 Hz/1.5 Hz (factory or authorized service center selectable only)			
AUTO/MAN Frequency	Factory or authorized service center selectable only			
Voltage THD	< 3% for linear load; < 6% for non-linear load			
Common-Mode Noise	< 0.5 Vrms			
Rated Load Power Factor[1]	0.85 (0.6 – 1.0) lagging			
Efficiency (ac-dc-ac)	≥83%		>85%	
Voltage Transient	< ±8% (Load of 0 – 100 %)			
Voltage Transient Recovery	50 ms to within 2% of nominal			
Rated Output Current (rms)	15 A	25 A	33.3 A	41.6 A
Max Peak Output Current	45 A	75 A	100 A	125 A

1. **Input/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site.
3. An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is placed in operation.
4. If Vin is below the minimum Vin window, the UPS goes to Battery Mode. If the UPS is in Fault and Vin is below the minimum Vin window, the UPS goes to Bypass Mode

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STANDARD MODELS: 3.6 – 10 KVA (CONT'D)

Unit (Capacity)	3.6kVA (3.1 kW) [1]	6 kVA (5.1 kW) [1]	8 kVA (6.8 kW) [1]	10 kVA (8.5 kW) [1]
Inverter Overload Capacity	125% for 30 sec./150% for 10 sec.			
Bypass Overload Capacity	125% for 10 min./1000% for 1 cycle			
Crest Factor	3.0			
Environment				
Operating Temperature 59 – 77 °F (15 – 25 °C) Recommended	60 Hz 32 – 104 °F (0 – 40 °C) 50 Hz 32 – 91 °F (0 – 33 °C)			
Storage Temperature	-4 – 104 °F (-20 – 40 °C)			
Installation Area	To be installed in a well ventilated area free of airborne dust, metal particles or flammable gas, allow at least 4 inches on all sides			
Operating Humidity	30 – 90% non-condensing			
Altitude	< 6600 ft. (2000 m) above sea level [2]			
Acoustical Noise	50 dB (A) maximum @ 1 meter from front panel			
Heat Generation (Typical)	2139 BTU/Hr	3564 BTU/Hr	4095 BTU/Hr	5118 BTU/Hr
Operation Diagnosis				
Battery Check	Performed on start up, by schedule, on-demand (user configurable)			
Input OV Protection	Standard			
Battery Lifetime	UPS calculates battery replacement time based upon battery ambient temperature (LCD display, LED and beeps)			
Internal Temperature	UPS gives indication of internal temperature, alarm when high temp			
Event Data Storage Registers	32 – Operation, 32 – Backup, 32 – Warnings, 32 – Faults, 32 – Test, 32 – System			
Applications				
Switches	Generator compatible			
Bypass Switch				
Bypass Disable	Static switch < ¼ cycle (50 Hz – 5 ms/60 Hz – 4.16 ms)			
Automatic Retransfer	Factory or authorized service center selectable only			
Interface/Communications				
Real Time Clock	Real Time Clock with backup Lithium Ion Battery			
Schedule Operation	Schedule ON/OFF operation of UPS using optional RemotEye 4 communication software			
Autostart	Automatic UPS Startup when AC is applied – Option can be enabled or disabled at user's discretion			
Remote ON/OFF	Standard – External terminal			
Emergency Power Off	Standard – Terminal contacts only			
LED Display	3 LED's indicating On-Line/Fault, Warning, and A/C Input			
Operator Interface	Interactive Touchscreen			

1. **Input/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. At 6600 ft (2000 m) above sea level, output capacity should be derated by 3% per additional thousand feet elevation.

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STANDARD MODELS: 3.6 – 10 KVA (CONT'D)

Unit (Capacity)	3.6kVA (3.1 kW) [1]	6 kVA (5.1 kW) [1]	8 kVA (6.8 kW) [1]	10 kVA (8.5 kW) [1]
Buzzer Volume	Standard (Fixed Volume)			
Power Connections	Standard – Hard wire, Optional – Receptacle Panel w/ Power Cord			
Remote Contacts	Standard (INV, BYP, BATT, LB, AC, FLT)			
RS232 ASCII Interface	Toshiba UPS Communication Protocol 2.0			
RemotEye 4 (Standard with XPi) (Optional with XP)	Remote communications package (HTTP/HTTPS, SNMP, Modbus TCP/RTU, BACnet IP/MSTP) via RJ-45 or RS-485			
Mechanical Design				
Topology	Unit enclosure is made from sheet metal meeting NEMA1 and UL Type 1			
Size (HxWxD) (max)	22.1x 10 x 34 in. (561 x 254 x 864 mm)	27.5 x 10 x 34 in. (699 x 254 x 864 mm)	28.4x 13 x 34.9 in. (721 x 330 x 886 mm)	28.4x 13 x 34.9 in. (721 x 330 x 886 mm)
Paint System	Powder coating			
Fan Panel[2]	Panel mounted on back of UPS to allow for easy replacement of fans			
Battery System				
Battery Replacement	Slide out battery packs accessible from front of UPS. Factory or authorized service center serviceable only.			
Battery Packs	Designed for battery acid leakage containment with six (6) batteries per pack			
Battery Pack Size (HxWxD) max.	5.0 x 7.3 x 19.0 in. (127 x 185 x 483 mm)			
Battery Pack Quantity	2	3	4	
Battery Manufacturer	YUASA			
Battery Type	REW45-12FR			
Toshiba's Part Number for Battery Pack	51896-FS			60995-FS

1. **Input/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. **Remove all sources of main AC power and wait five minutes before replacing fans.**

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Standard Models: 14 – 22 kVA

STANDARD MODELS: 14 – 22 KVA (CONT'D)

Capacity	14 kVA (11.9 kW)[1]	18 kVA (15.3 kW)[1]	22 kVA (18.7 kW)[1, 5]
General			
Typeform	UH3G2L140C61T H3BG2L140C61T	UH3G2L180C61T H3BG2L180C61T	UH3G2L220C61T H3BG2L220C61T
Certifications	ANSI C62.41 (IEEE 587), UL 1778, CUL, CE, FCC Class A , NEC (NFPS-70), NEMA/PE1-1993, OSHA, ASME, ISO 9001, ISO 14001:2004 , RoHS Compliant		
Input Characteristics			
Input Voltage [1]	Single-phase, 208/240 VAC, +10%[1, 6] (to -30% at typical 70% load)		
Input Frequency	45-65 Hz (auto-sensing)		
Input Capacity	14 kVA	18 kVA	22 kVA
Input /(Max Input) Current @208V	67.2 (68.9) A	86.4 (88.1) A	106 (107) A
Input /(Max Input) Current @240V	58.2 (59.7) A	74.9 (76.3) A	92.0 (93.0) A
Input Power Factor	0.98 Typical, 0.95 Minimum@ 100% Load[1]		
Current THD (linear load)	< 5%		
Internal AC Input Breaker rating	100 A / 277 V		125 A / 277 V
Battery Characteristics			
Battery Type	Valve Regulated Lead Acid, Flame Retardant		
Backup time, fully charged @ 0.7 power factor, 77 F	7 min.[2]		5 min.[2]
Backup time, fully charged @ 0.85 power factor, 77 F	7 min.[2]	5 min.[2]	3 min.[2]
Recharge Time	24hr. (full), 12hr.(90%) for internal batteries only[3]		
Battery Voltage (Nominal)	288 VDC		
Output Characteristics			
Output Voltage	Single-phase, 240/208/120 volts		
Output Voltage Regulation	= ±3%		
Output Frequency	±0.5Hz/1.0Hz/1.5Hz (factory/authorized service center selectable only)		
AUTO/MAN Frequency	Factory or authorized service center selectable only		
Voltage THD	< 3% for linear load; < 6% for non-linear load		
Common-Mode Noise	< .5 Vrms		
Rated Load Power Factor[1]	0.85 (0.6 - 1.0) lagging		
Efficiency (AC-DC-AC)	>86% [4]		
Voltage Transient	< ±8% (Load of 0 to 100 %)		
Voltage Transient Recovery	50 ms to within 2% of nominal		
Rated Output Current (rms)	58 A	75 A	91.6 A

1. **Input/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site.
3. An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is placed in operation.
4. Subject to update without notice.
5. Derate to 18.7 kVA (15.9 kW) for 50 Hz operation.
6. If Vin is below the minimum Vin window, the UPS goes to Battery Mode. If the UPS is in Fault and Vin is below the minimum Vin window, the UPS goes to Bypass Mode

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STANDARD MODELS: 14 – 22 KVA (CONT'D)

Capacity	14 kVA (11.9 kW)[1]	18 kVA (15.3 kW)[1]	22 kVA (18.7 kW)[1, 5]
Max Peak Output Current	174 A	225 A	275 A
Inverter Overload Capacity	125%-30 sec./150%-10 sec		
Bypass Overload Capacity	125%-10 min./1000%-1 cycle		
Crest Factor	3.0		
Environment			
Operating Temperature 59 – 77 °F (15 – 25 °C) Recommended	60 Hz 32 – 104 °F (0 – 40 °C) 50 Hz 32 – 91 °F (0 – 33 °C)		
Storage Temperature	-4 – 104 °F (-20 – 40 °C)		
Installation Area	To be installed in a well ventilated area free of airborne dust, metal particles or flammable gas, allow at least 4 inches on all sides		
Operating Humidity	30 – 90% (no condensation)		
Altitude	< 6600 ft. (2000 m) above sea level [2]		
Acoustical Noise	50 dB (A) maximum @ 1 meter from front panel		
Heat Generation (Typical)	6610 BTU/Hr[3]	8499 BTU/Hr[3]	10,387 BTU/Hr[3]
Operation Diagnosis			
Battery Check	Performed on start up, by schedule, on-demand (user configurable)		
Input OV Protection	Standard		
Battery Lifetime	UPS calculates battery replacement time based upon battery ambient temperature (LCD display, LED and beeps)		
Internal Temperature	UPS gives indication of internal temperature, alarm when high temp		
Event Data Storage Registers	32 – Operation, 32 – Backup, 32 – Warnings, 32 – Faults, 32 – Test, 32 – System		
Applications			
Switches	Generator compatible		
Bypass Switch			
Bypass Disable	Static switch <1/4 cycle (50Hz: 5 ms/60Hz: 4.16 ms)		
Automatic Retransfer	Factory or authorized service center selectable only		
Interface/Communications			
Real Time clock	Real Time Clock with backup Lithium Ion Battery		
Schedule Operation	Schedule ON/OFF operation of UPS using optional RemotEye III communication software		
Autostart	Automatic UPS Startup when AC is applied – Option can be enabled or disabled at user's discretion		
Remote ON/OFF	Standard – External terminal		
LED Display	3 LED's indicating On-Line/Fault, Warning, and A/C Input		
Operator Interface	Interactive Touchscreen		
Buzzer Volume	Standard (Fixed Volume)		

1. **nput/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. At 6600 ft (2000 m) above sea level, output capacity should be derated by 3% per additional 1000 feet elevation.
3. Subject to update without notice.
4. Derate to 18.7 kVA (15.9 kW) for 50 Hz operation.

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STANDARD MODELS: 14 – 22 KVA (CONT'D)

Capacity	14 kVA (11.9 kW)[1]	18 kVA (15.3 kW)[1]	22 kVA (18.7 kW)[1, 5]
Power Connections	Standard – Hard wire		
Emergency Power Off	Standard – Terminal contacts only		
Remote Contacts	Standard (INV, BYP, BATT, LB, AC, FLT)		
RS232 ASCII Interface	Toshiba UPS Communication Protocol 2.0		
RemotEye 4 (Standard with XPi) (Optional with XP)	Remote communications package (HTTP/HTTPS, SNMP, Modbus TCP/RTU, BACnet IP/MSTP) via RJ-45 or RS-485		
Mechanical Design			
Enclosure	Enclosure of unit made from sheet metal meeting NEMA1 and UL		
Size (HxWxD) (max)	39.0 x 17.5 x 36.1 in. (991 x 445 x 917 mm)		
Paint System	Powder coating		
Fan Panel	Panel mounted on back of UPS to allow for easy replacement of fans		
Battery System			
Battery Replacement	Slide out battery packs accessible from front of UPS, factory or authorized service center serviceable only		
Battery Packs	Designed for battery acid leakage containment with (6) batteries per pack		
Battery Pack Size (HxWxD) max.	5.0 x 7.3 x 19.0 in. (127 x 185 x 462 mm)		
Battery Pack Quantity	8		
Battery Manufacturer	YUASA		
Battery Type	REW45-12FR		
Toshiba Part Number for Battery Pack	51896-FS		60995-FS

1. **Input/output figures rated for 240 volts unless otherwise stated. Output ratings given for 0.85PF are only valid when the input voltage is greater than 204 volts; otherwise, ratings given for 0.70PF are applicable.**
2. Derate to 18.7 kVA (15.9 kW) for 50 Hz operation.

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Appendix B: 1600XP/1600XPi Command Parameter Table

Access: U - User, A - Admin, D - Dealer, Svc/QC - Service /QC, F - Factory
R - Read only, R/W Read and Write
* - Changing parameter requires restarting Unit.

Parameter			Access					1600XP	
Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
001	UPS Manufacturer	Manufacturer	R	R	R/W	R/W	R/W	“TOSHIBA”	
002	UPS Typeform*	Typeform*	R	R	R	R/W	R/W	“UH3B2B060C6”	See Toshiba UPS Typeform document At startup, firmware looks at kVA setting to calculate rated input/output current and power factor. It will default to 6 kVA rated value if kVA number is not pre-defined values. Also, Latched in UPS Overall Status Bit Map **(Restart Required)**
003	UPS Serial Number	Serial No	R	R	R	R/W	R/W	“080112345”	YYMMSSSSS YY – 2 digits of year MM – 2 digits of month SSSSS – 5 digits serial numbers
004	UPS Main Firmware Version	Main FWare Ver	R	R	R	R	R	“UH3MSV01000”	UXXYFVMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) FV – Firmware Version MM – Major version RRR – Minor version
005	UPS Main Boot Sector Version	Main BSector Ver	R	R	R	R	R	“UH3MBS01000”	UXXYBSMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) BS – Boot Sector MM – Major version RRR – Minor version

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
006	UPS Main Boot Loader Version	Main BLoader Ver	R	R	R	R	R	"UH3MBL01000"	UXXYBLMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) BL – Bootloader Version MM – Major version RRR – Minor version
007	UPS Job Number	Job No	R	R	R	R/W	R/W	"JB0123456789"	JBXXXXXXXXX JB – Job Number XXXXXXXXX – Order Number (Variable Size)
008	Test Person's First and Last Name Initial	Test Person	R	R	R	R/W	R/W	"TA"	"FL" ; First Name initial then Last Name initial
009	UPS Test Date	Test Date	R	R	R	R/W	R/W	"20080101"	Format: YYYYMMDD
010	UPS Hardware Built Date	HWare Built Date	R	R	R	R/W	R/W	"20080101"	Format: YYYYMMDD
011	Main Firmware Built Date	Main FWare BDate	-	-	R	R	R		Format: Mmm DD, YYYY (Ex. Jan 04, 2006 Automatically read by compiler)
012	Main Firmware Built Time	Main FWare BTime	-	-	R	R	R		Format: HH:MM:SS (Ex. 18:45:45 Automatically read by compiler)
013	EEPROM Version	Main EEPROM Ver	R	R	R	R	R/W	"UH3MEE00000"	UXXYEEMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) EE – EEPROM Version MM – Major version RRR – Minor version
015	UPS System Name	System Name	R	R/W	R/W	R/W	R/W	"TOSHIBA H3"	Such as Plant3, Upstair...
016	UPS Attached Devices	Attached Device	R	R/W	R/W	R/W	R/W	"None"	
017	UPS Installation Date	Installed Date	R	R/W	R/W	R/W	R/W	"20080101"	Format: YYYYMMDD
018	CRC Checksum	CRC Checksum				R	R	0	
019	Functional Test Date	Ftest Date				R/W	R/W	"20080101"	Format: YYYYMMDD
020	Functional Test File	Ftest File				R/W	R/W	"NO"	

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
101	Input Power Supply Configuration	Input Config	R	R	R	R	R		Limits: 0 – 15 0 = unknown (>= 0, < 199) 1 = 200V – 60Hz (>= 200, <207) 2 = 200V – 50Hz (>= 200, <207) 3 = 208V – 60Hz (>= 208, < 229) 4 = 208V – 50Hz (>= 208, < 229) 5 = 230V – 60Hz (>= 230, < 239) 6 = 230V – 50Hz (>= 230, < 239) 7 = 240V – 60Hz (>= 240, < 32767) 8 = 240V – 50Hz (>= 240, < 32767) 9 = 220V – 60Hz 10 = 220V – 50Hz 11 = 120V – 60Hz 12 = 120V – 50Hz These numbers are stored in recording features
102	Number of Input Lines	No of Input Line	R	R	R	R/W	R/W	1	Range: 1 – 2
103	Input Voltage (Total)	Input Voltage	R	R	R	R	R	0	Units: Vrms
104	Input Current (Total)	Input Current	R	R	R	R	R	0	Units: 0.1 Arms
105	Input Frequency (Total)	Input Frequency	R	R	R	R	R	0	Units: 0.1 Hz
106	Input Active Power	Input Power(W)	R	R	R	R	R	0	-1 if input active power can not be calculated. Units: W
107	Input Apparent Power	Input Power(VA)	R	R	R	R	R	0	Units: VA
108	Input Power Factor	Input Pfactor	R	R	R	R	R	0	-1 if input power factor can not be calculated. Units: 0.01
111	Rated Input Voltage (Total)	Rated Vin	R	R/W	R/W	R/W	R/W	240	Must be non-zero value. Undefined behavior if diveded by zero. Range: 1 – 300 Units: Vrms
112	Rated Input Current (Total)	Rated Iin	R	R	R	R	R	250	Calculated from typeform and not writtable. Units: 0.1 Arms
113	Rated Input Frequency (Total)	Rated Fin	R	R	R	R	R		Determined from input frequency detection Units: 0.1 Hz

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
114	Input Undervoltage Warning Detection Level	VIUV DeLevel	-	-	-	R/W	R/W	66 %	Input Under Voltage Error detection level setup in percentage. Range: 0-100%
115	Input Undervoltage Warning Recovery Level	VIUV ReLevel	-	-	-	R/W	R/W	70 %	Input Under Voltage Error recovery level setup in percentage. Range: 0-100%
116	Input Undervoltage Gradient	VIUV Gradient	-	-	-	R/W	R/W	6	one of the properties to calculated input Under Voltage detection and recovery level. Range: 0-50
117	Input Undervoltage Hysteresis	VIUV Hysteresis	-	-	-	R/W	R/W	8	one of the properties to calculated input Under Voltage detection and recovery level. Range: 0-100%
118	Input Undervoltage Section	VIUV Section	-	-	-	R/W	R/W	230	One of the properties to calculated input Under Voltage detection and recovery level. Range: 0 – 300
119	Input Overvoltage Warning Detection Level	VIOV DeLevel	R	R	R	R/W	R/W	274	Input Over Voltage Error detection level. Range: 100 – 500 Units: Vrms
120	Input Overvoltage Warning Recovery Level	VIOV ReLevel	R	R	R	R/W	R/W	264	Input Over Voltage Error recovery level. Range: 100 – 500 Units: Vrms
121	Input Voltage Gain (Total)	Vin Gain	-	-	-	R/W	R/W	6720	Used this value to convert AD value to actual unit. Range: 1 – 32767
122	Input Voltage Offset (Total)	Vin Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Ramge: -32767 – 32767
123	Input Voltage AD Amount (Total)	Vin AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle.
124	Input Current Gain (Total)	Iin Gain	-	-	-	R/W	R/W	4897	Used this value to convert AD value to actual unit. Range: 1 – 32767
125	Input Current Offset (Total)	Iin Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32767 – 32767
126	Input Current AD Amount (Total)	Iin AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle.

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
127	Input Current 100% Amount	Iin 100% Amount	-	-	-	R/W	R/W	250	Range: 1 – 1500 Units: dA
128	Input Current Reference Phase Adjustment*	Iref Phase Adj*	-	-	-	R/W	R/W	14800	Time delay adjustment to sync the phase of input voltage and current due to hardware and software delay. (Restart Required) Range: 0 – 32767 Units: duS
129	Input Undervoltage Warning Detection Delay	VIUV DeDelay	-	-	-	-	R/W	1	Input Under Voltage Error detection delay in consecutively. Range: 0 – 600 Units: 1/2 Cyc
130	Input Undervoltage Warning Recovery Delay	VIUV ReDelay	-	-	-	-	R/W	8	Input Over Voltage Error recovery delay in consecutively Range: 0 – 600 Units: 1/2 Cyc
131	Input Overvoltage Warning Detection Delay	VIOV DeDelay	-	-	-	-	R/W	1	Input Under Voltage Error detection delay in consecutively Range: 0 – 600 Units: 1/2 Cyc
132	Input Overvoltage Warning Recovery Delay	VIOV ReDelay	-	-	-	-	R/W	8	Input Over Voltage Error recovery delay in consecutively Range: 0 – 600 Units: 1/2 Cyc
133	Input Frequency Warning Detection Delay	FIERR DeDelay	-	-	-	-	R/W	4	Input Frequency Error detection delay in consecutively Range: 0 – 300 Units: 1 Cyc
134	Input Frequency Warning Recovery Delay	FIERR ReDelay	-	-	-	-	R/W	8	Input Frequency Error recovery delay in consecutively Range: 0 – 300 Units: 1 Cyc
135	Input Voltage in percentage	Input Voltage(%)	R	R	R	R	R	0	Ratio of input voltage to rated input voltage. Units: %
136	Input Current in percentage	Input Current(%)	R	R	R	R	R	0	Ratio of input current to rated input current. Units: %
137	Calculated Input Undervoltage Warning Detection Level	VIUV DeLevel	R	R	R	R	R	0	UPS calculates input voltage detection level according to output power (W) percentage, Gradient, Section and Rated values. Units: V

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
138	Calculated Input Undervoltage Warning Recovery Level	VIUV ReLevel	R	R	R	R	R	0	UPS Calculates input voltage recovery level according to detection level and hystersis. Units: V
139	Rated Active Input Power (W)	Rated InPower(W)	R	R	R	R	R	0	UPS calculates at the startup according to typeform, efficiency and rated power factor. Units: W
141	Input Frequency Setup in Case of Input Frequency Detection Error*	Freq on FIERR*	R	R/W	R/W	R/W	R/W	6000	This frequency setup is used after UPS could not determine input frequency in 3 Seconds. Then UPS determine output frequency according to DIP Switch or EEPROM setup. Range: 500 – 600 Units: dHz
201	Output Power Supply Configuration	Output Config	R	R	R	R	R		0 = unknown (>= 0, < 199) 1 = 200V – 60Hz (>= 200, <207) 2 = 200V – 50Hz (>= 200, <207) 3 = 208V – 60Hz (>= 208, < 229) 4 = 208V – 50Hz (>= 208, < 229) 5 = 230V – 60Hz (>= 230, < 239) 6 = 230V – 50Hz (>= 230, < 239) 7 = 240V – 60Hz (>= 240, < 32767) 8 = 240V – 50Hz (>= 240, < 32767) 9 = 220V – 60Hz 10 = 220V – 50Hz 11 = 120V – 60Hz 12 = 120V – 50Hz These numbers are stored in recording features. Range: 0 – 15
202	Number of Output Lines	No of Output Line	R	R	R	R/W	R/W	1	Range: 1 – 2
203	Output Voltage (Total)	Output Voltage	R	R	R	R	R	0	Units: Vrms
204	Output Current (Total)	Output Current	R	R	R	R	R	0	Units: 0.1 Arms
205	Output Frequency (Total)	Output Frequency	R	R	R	R	R	0	Calculated only at Bypass mode and inverter mode. Set to zero for other modes. Units: 0.1 Hz

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
206	Output Active Power (W)	Output Power(W)	R	R	R	R	R	0	-1 if output active power can not be calculated (Bypass Mode). Units: W
207	Output Apparent Power (VA)	Output Power(VA)	R	R	R	R	R	0	Units: VA
209	Output Load Percentage (Total)	Output Load (%)	R	R	R	R	R	0	Defined as output current percentage or output active power whichever higher. Units: %
215	Rated Output Voltage (Total)	Rated Vout	R	R/W	R/W	R/W	R/W	240	Must be non-zero value. Undefined behavior if diveded by zero. Range: 1 – 300 Units: Vrms
216	Rated Output Current (Total)	Rated Iout	R	R	R	R/W	R/W	250	Calculated from typeform and not writtable. Range: 0 – 1500 Units: 0.1 Arms
217	Rated Output Frequency (Total)	Rated Fout	R	R	R	R	R	0	Determined according to DIP switch or EEPROM setup. Units: 0.1 Hz
218	Rated Output Active Power	Rated Pout(W)	R	R	R	R	R	0	UPS calculates at the startup according to typeform, efficiency and rated power factor. Units: W
219	Rated Output Apparent Power	Rated Pout(VA)	R	R	R	R	R	0	UPS calculates at the startup according to typeform, efficiency and rated power factor. Units: VA
220	Output Under Voltage Fault Detection Level	VOUV DeLevel	R	R	R	R/W	R/W	90	Output Under Voltage Detection level in percentage of Rated Output Voltage. Range: 0 – 100 Units: %
222	Output Overvoltage Fault Level	VOOV DeLevel	R	R	R	R/W	R/W	110	Output Over Voltage Detection level in percentage of Rated Output Voltage. Range: 100 – 150 Units: %
224	Output Frequency Synchronization Range	Fo Syn Window	R	R	R	R/W	R/W	10	Output voltage will follow input voltage if the difference of input and output are within this value (according to slew rate, of course). Range: 1 – 30 Units: 0.1 Hz

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
225	Output Frequency Slew Rate	Fo Slew Rate	-	-	-	R/W	R/W	10	The smallest control amount to add or subtract from the current output frequency. Ups converts to a correct value of per cycle instead of per second. Range: 1 – 30 Units: 0.1 Hz
226	Output Voltage Adjustment (Total)	Vout Adjust	R	R/W	R/W	R/W	R/W	0	End user's manual adjustment for output voltage if desired. 1 increment or decrement will give approximately 1 Vrms output. Range: -10 – 10
227	Output Current 100% Amount	Iout 100% Amount	-	-	-	R/W	R/W	250	Range: 0 – 1500 Units: 0.1 A
228	Output Overload Warning/ Fault Detection Level in Percentage	OOL Delevel	-	-	-	R/W	R/W	110	Range: 0 – 150 Units: %
229	Output Overload Warning/ Fault Detection Delay at 125% @ 25 ^{0} C	OOL DeDelay	-	-	-	R/W	R/W	30	Range: 0 – 300 Units: Sec
230	Output Overload Warning Recovery Level in Percentage	OOL ReLevel	-	-	-	R/W	R/W	105	Range: 90 – 120 Units: %
231	Output Overload Warning Recovery Delay	OOL ReDelay	-	-	-	R/W	R/W	160	Range: 120 – 1000 Units: Sec
232	Output Voltage Compensation	Vout Comp. Step	-	-	-	R/W	R/W	20	Output voltage will be compensated according to this setup and current percentage. Range: 1 – 200 Units: 1 Cyc
233	Output Voltage Gain (Phase A or Total)	Vout Gain	-	-	-	R/W	R/W	7987	Used this value to convert AD value to actual unit. Range: 1 – 32767
234	Output Voltage Offset (Phase A or Total)	Vout Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32767 – 32767
235	Output Voltage AD Amount (Phase A or Total)	Vout AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle.
242	Output Current Gain (Phase A or Total)	Iout Gain	-	-	-	R/W	R/W	1131	Rated at 240 V output voltage. Used this value to convert AD value to actual unit. Range: 1 – 32767

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
243	Output Current Offset (Phase A or Total)	Iout Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32767 – 32767
244	Output Current AD Amount (Phase A or Total)	Iout AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle.
251	Output Voltage Reference Phase Adjustment for 60 Hz*	Vref PhAdj 60 Hz*	-	-	-	R/W	R/W	-8	Time delay adjustment to sync the actual phase of output and plotting. (Restart Required). Range -64 – 64
252	Phase Lock Loop Controller's Propotional Gain	PII Gp	-	-	-	-	R/W	4	Range: 0 – 128 Units: /256
253	Phase Lock Loop Controller's Integral Gain	PII Gi	-	-	-	-	R/W	2	Range: 0 – 128 Units: /256
254	Output Voltage Reference Amplitude	Vref Amplitute	-	-	-	R/W	R/W	246	Calibrated at no Load output voltage. Range: 0 – 300 Units: /128
255	Timer 3 Offset Remainder	T3 Offset Remain	-	-	-	-	R/W	350	Range: 0 – 1500 Units: /128
256	DC to AC Efficiency	DC-AC Efficiency	-	-	-	R/W	R/W	81	Range: 0 – 100 Units: %
257	Frequency Syn to Asyn Warning Detection Delay	Freq Asyn DeDelay	-	-	-	-	R/W	4	Range: 0 – 300 Units: 1 Cyc
258	Frequency Asyn to Syn Recovery Delay	Freq Syn ReDelay	-	-	-	-	R/W	8	Range: 0 – 300 Units: 1 Cyc
259	Phase Syn to Asyn Warning Detection Delay	Ph. ASyn DeDelay	-	-	-	-	R/W	4	Range: 0 – 300 Units: 1 Cyc
260	Phase Asyn to Syn Recovery Delay	Ph. Syn ReDelay	-	-	-	-	R/W	8	Range: 0 – 300 Units: 1 Cyc
261	Rated Power Factor	Rated PFactor	R	R	R	R/W	R/W	85	Calculated from typeform and rated voltage. Range: 0 – 120 Units: 0.01
262	AC to AC Efficiency	AC-AC Efficiency	-	-	-	R/W	R/W	85	Range: 0 – 100 Units: %

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
264	OutputTo NoOutput or NoOutput to Output mode Gates transfer timing at Vout*	Gates Xfer Vout*	-	-	-	-	R/W	75	Output to no output or no output to output mode transfer timing in degree. Other mode, trasfer timing is at zero cross (Restart Required). Range: 60 – 180 Units: 1 Cyc
265	Overload Detection Disable Delay	OL Disable Delay	-	-	-	-	R/W	8	Range: 0 – 16 Units: 1/2 cyc
266	Present plotting output voltage reference amplitute	Present VoutRef	-	-	-	R	R	0	uC generated reference amplitute.
267	Output Voltage Reference Phase Adjustment for 50 Hz*	Vref PhAdj 50 Hz*	-	-	-	R/W	R/W	-7	Range: -64 – 64
268	Output Power Limited by Converter (1) / Transformer (0)	Cnv/Xfmer Lmt	-	-	-	R/W	R/W	0	power calculation is limited by 1 = input converter limited 0 = output transformer limited (default)
269	Output Voltage before Tranformer Compensation	Vout B4 Comp.	-	-	-	R/W	R/W	0	Units: V
270	Output Current before Tranformer Compensation	Iout B4 Comp.	-	-	-	R/W	R/W	0	Units: 0.1 A
271	Inverter Mode A Compensation	Comp. Ainv	-	-	-	R/W	R/W	2	Range: 0 – 512 Units: /128
272	Inverter Mode B Compensation	Comp. Binv	-	-	-	R/W	R/W	10	Range: 0 – 512 Units: /128
273	Inverter Mode C Compensation	Comp. Cinv	-	-	-	R/W	R/W	0	Range: 0 – 512 Units: /128
274	Bypass Mode A Compensation	Comp. Abyp	-	-	-	R/W	R/W	3	Range: 0 – 512 Units: /128
275	Bypass Mode B Compensation	Comp. Bbyp	-	-	-	R/W	R/W	7	Range: 0 – 512 Units: /128
276	Bypass Mode C Compensation	Comp. Cbyp	-	-	-	R/W	R/W	1	Range: 0 – 512 Units: /128
277	Overload Time Windw	OL Time Wndw	-	-	-	R/W	R/W	10	Range: 0 – 30 Units: min

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
278	Rated Output Primary Transformer	Rated OutXfmer(P)	-	-	-	R/W	R/W	230	Range: 200 – 300 Units: V
279	50 Hz Derating	50Hz Derating	-	-	-	R/W	R/W	100	Range: 50 – 150 Units: %
280	60 Hz Derating	60Hz Derating	-	-	-	R/W	R/W	100	Range: 50 – 150 Units: %
301	Bypass Power Supply Configuration	Bypass Config	R	R	R	R	R		Always, the same as input configuration 0 = unknown (>= 0, < 199) 1 = 200V – 60Hz (>= 200, <207) 2 = 200V – 50Hz (>= 200, <207) 3 = 208V – 60Hz (>= 208, < 229) 4 = 208V – 50Hz (>= 208, < 229) 5 = 230V – 60Hz (>= 230, < 239) 6 = 230V – 50Hz (>= 230, < 239) 7 = 240V – 60Hz (>= 240, < 32767) 8 = 240V – 50Hz (>= 240, < 32767) 9 = 220V – 60Hz 10 = 220V – 50Hz 11 = 120V – 60Hz 12 = 120V – 50Hz These numbers are stored in recording features
302	Number of Bypass phases	No Of Bypass Line	R	R	R	R/W	R/W	1	
303	Bypass Voltage (Total)	Bypass Voltage	R	R	R	R	R	0	Always the same as input voltage. Units: Vrms
304	Bypass Current (Total)	Bypass Current	R	R	R	R	R	0	Only valid at bypass mode and zero for other ups mode. Units: 0.1 A_{rms}
305	Bypass Frequency (Total)	Bypass Frequency	R	R	R	R	R	0	Always the same as input frequency. Units: 0.1 Hz
307	Bypass Apparent Power (VA)	Bypass Power(VA)	R	R	R	R	R	0	Only valid at bypass mode and zero for other ups mode. Units: VA
315	Bypass Undervoltage Warning Detection Level	VBypUV DeLevel	R	R	R	R/W	R/W	62	Range: 0 – 100 Units: %
316	Bypass Undervoltage Warning Recovery Level	VBypUV ReLevel	R	R	R	R/W	R/W	66	Range: 0 – 100 Units: %

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
317	Bypass Overvoltage Warning Detection Level	VBypOV DeLevel	R	R	R	R/W	R/W	284	Range: 0 – 500 Units: V
318	Bypass Overvoltage Warning Recovery Level	VBypOV ReLevel	R	R	R	R/W	R/W	274	Range: 0 – 500 Units: V
320	Bypass Overload Fault Detection Delay at 125% @ 25 ^{0} C	BypOL DeDelay	-	-	-	R/W	R/W	600	Range: 0 – 1000 Units: sec
339	Bypass Undervoltage Detection Delay	VBypUV DeDelay	-	-	-	-	R/W	1	Range: 0 – 600 Units: 1/2 cyc
340	Bypass Undervoltage Recovery Delay	VBypUV ReDelay	-	-	-	-	R/W	128	Range: 0 – 600 Units: 1/2 cyc
341	Bypass Overvoltage Detection Delay	VBypOV DeDelay	-	-	-	-	R/W	1	Range: 0 – 600 Units: 1/2 cyc
342	Bypass Overvoltage Recovery Delay	VBypOV ReDelay	-	-	-	-	R/W	128	Range: 0 – 600 Units: 1/2 cyc
343	Bypass Frequency Error Detection Delay	FBypERR DeDelay	-	-	-	-	R/W	4	Range: 0 – 300 Units: cyc
344	Bypass Undervoltage Detection Delay	FBypERR ReDelay	-	-	-	-	R/W	128	Range: 0 – 300 Units: cyc
401	DC Bus Voltage (Total)	DC Bus Total	R	R	R	R	R	0	Units: Vdc
402	DC Bus Voltage (Positive)	DC Bus Positive	R	R	R	R	R	0	Units: Vdc
403	DC Bus Voltage (Negative)	DC Bus Negative	R	R	R	R	R	0	Units: Vdc
404	Rated DC Bus Voltage	Rated DC Bus	R	R	R	R/W	R/W	770	Range: 200 – 800 Units: Vdc
405	DC Bus Overvoltage Fault Detection Level Percentage	DCOV DeLevel	-	-	-	R/W	R/W	110	Range: 80 – 120 Units: %
406	DC Bus Undervoltage Fault Detection Level Percentage	DCUV DeLevel	-	-	-	R/W	R/W	83	Range: 0 – 100 Units: %
409	DC Bus Imbalance Fault Detection Level Percentage	DCIB DeLevel	-	-	-	R/W	R/W	11	Range: 0 – 50 Units: %

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
415	Vdc Gain (Positive)	VdcP Gain	-	-	-	R/W	R/W	7947	Used this value to convert AD value to actual unit. Range: 1 – 32767
416	Vdc Offset (Positive)	VdcP Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32768 – 32767
417	Vdc AD Amount (Positive)	VdcP AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle
418	Vdc Gain (Negative)	VdcN Gain	-	-	-	R/W	R/W	7947	Used this value to convert AD value to actual unit. Range: 1 – 32767
419	Vdc Offset (Negative)	VdcN Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32768 – 32767
420	Vdc AD Amount (Negative)	VdcN AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle
430	DC Bus Slew Rate	DC Bus Slew Rate	-	-	-	-	R/W	5	Range: 0 - 100
431	DC Bus Soft charging time	SoftCharge Time	-	-	-	R/W	R/W	360	Range: 0 - 1200
432	DC Bus Hard charging time	HardCharge Time	-	-	-	R/W	R/W	120	Range: 120 - 1200
436	Calibrated DC Bus Reference	Calibrated DCRef	-	-	-	R/W	R/W	100	Starts from DC Bus reference and slowly ramp up to this final target value. DC Bus and this value is inversely proportional.
437	Present DC Bus Reference	Present DCRef	-	-	-	R	R	0	Presently plotting DC Bus reference
438	ACDC Reference	AC/DC Ref	-	-	-	R/W	R/W	288	Range: -310 to 310
439	Input Current Reference Offset Adjustment	Ii Ref Offset	-	-	-	R/W	R/W	0	Range: -96 to 96
440	DC undervoltage detection delay	DCUV SW DeDelay	-	-	-	R/W	R/W	2	Range: 1-32
441	DC overvoltage detection delay	DCOV SW DeDelay	-	-	-	R/W	R/W	2	Range: 1-32
442	DCUB Detection Delay	DCUB SW DeDelay	-	-	-	R/W	R/W	2	Range: 1-32
501	Battery Voltage	Battery Voltage	R	R	R	R	R	0	Units: Vdc

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
503	Battery Discharge Current	Discharge Current	R	R	R	R	R	0	valid only when dischaging and zero for charged mode Units: 0.1 Adc
504	Battery Capacity	Battery Capacity	R	R/W	R/W	R/W	R/W	0	Range: 0 – 150 Units: %
505	Battery Runtime	Battery Runtime	R	R	R	R	R	400	
506	Battery Charger Status	Charger Status	R	R	R	R	R	0	0 = Normal Charging 1 = Preventive Charging 2 = Stop Charging
507	Number of Battery Discharges	Total Discharges	R	R/W	R/W	R/W	R/W	0	Increment when backup mode more than 10 Sec long
508	Calculated Battery Shutdown Voltage	Cal Battery Vsd	R	R	R	R	R		Calculated from manufacturer's data sheet. Units: Vdc
509	Battery Life Remaining	Batt Life Remain	R	R/W	R/W	R/W	R/W	43800	Range: 0 – 43800 Units: Hr
511	Internal Battery Rated Capacity in Ampere-Hour	Rated Ahr	R	R/W	R/W	R/W	R/W	9	Battery capacity Ampere-Hour such as 7 AHr or 9 Ahr. Range: 1 – 15 Units: Ahr
512	Number Internal Battery Packs In Series String	No Batt(Series)	R	R/W	R/W	R/W	R/W	18	Range: 0 – 48
513	Number Internal Battery Strings in Parallel	No Batt(Paral)	R	R/W	R/W	R/W	R/W	1	Number of internal battery strings. 3.6-14kVA=1, 18/22kVA=2. Range: 1 – 24
514	Battery Installation Date	Batt Ins Date	R	R/W	R/W	R/W	R/W	"20080101"	YYYYMMDD
516	Battery Voltage Shutdown Level	Batt SDown Level	R	R	R/W	R/W	R/W	79	Percentage of norminal battery voltage. Range: 0 – 120 Units: %
522[1]	Enable External Battery Cabinet 1	Enable BC1	R	R/W	R/W	R/W	R/W	0	
523[1]	Enable External Battery Cabinet 1	Enable BC2	R	R/W	R/W	R/W	R/W	0	
524	External Batt Cabinet Installation Status	SbatEx	-	-	-	R/W	R/W	0	0: Uninstalled 1: Installed

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
525	External Batt Cabinet Number of Battery Packs in Series	No Ex Bat(Series)	R	R/W	R/W	R/W	R/W	0	Number of external batteries in series string. (24 for one or two battery cabinets) Range: 0 – 48
526	External Batt. Cabinet Number of Battery Strings in Parallel	No Ex Bat(Paral)	R	R/W	R/W	R/W	R/W	0	Number of external battery strings in parallel Depends on UPS rating and Battery Cabinet Type. Typically One external battery cabinet =3, two cabinet =6 Range: 0 – 24
527	External Battery Cabinet Rated Battery Capacity in Ampere-Hour	Ex Batt Rated Ahr	R	R/W	R/W	R/W	R/W	0	External matching battery cabinets use same battery as internal: 9 Ah. (same as 511. Non-matching may be different) Range: 0 – 12 Units: Ahr
528	External Battery Cabinet Rated Battery Discharge C Rate	Ex Batt C Rate	R	R/W	R/W	R/W	R/W	0	Range: 0 – 12 Units: C
529	External Battery Cabinet Installation Date	Ext Batt Ins Date	R	R/W	R/W	R/W	R/W	"20080101"	Format: YYYYMMDD
532	Battery Voltage Gain	Vbat Gain	-	-	-	R/W	R/W	8298	Used this value to convert AD value to actual unit. Range: 1 – 32767
533	Battery Voltage Offset	Vbat Offset	-	-	-	R/W	R/W	0	Feedback Offset adjustment due to hardware components and software AD converter's offset. Range: -32768 – 32767
534	Battery Voltage AD Amount	Vbat AD	-	-	-	R	R	0	AD summation of 16 samples per half cycle.
544	Charger Reference (Normal Charging Mode)	Charger Ref(Norm)	-	-	-	R/W	R/W	55	Range: 0 – 320
545	Low Batery Level	Low Batt Level	R	R	R/W	R/W	R/W	90	% of battery norminal voltage. Range: 0 – 100 Units: %
546	Charger Overvoltage Detection Delay	VChrgOV DeDelay	R	R	R/W	R/W	R/W	60	(Restart Required) Range: 0 – 360 Units: Sec
547	Calculated Low Battery Level in Vdc	Cal LB Level	R	R	R	R	R	0	Calculated from level setup Command 545. Units: Vdc

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
548	Charger Reference (Preventive Charging Mode)	Charger Ref(Prev)	-	-	-	R/W	R/W	150	Range: 0 – 320
549	Present Charger Reference	Charger Ref	-	-	-	R	R	0	Presently plotting charger reference
550	Charger Overvoltage Detection Level	CHRGOV DeLevel	-	-	-	R/W	R/W	117	Range: 100 – 150 Units: %
551	Charger Overvoltage warning detection delay	CHRGOV WrnDeDelay	-	-	-	R/W	R/W	8	Range: 1 – 240 Units: 1/2 Cyc
552	Charger Overvoltage warning recovery delay	CHRGOV WrnReDelay	-	-	-	R/W	R/W	1	Range: 0 – 59 Units: Sec
553	Charger Overvoltage fault detection delay	CHRGOV FltDeDelay	-	-	-	R/W	R/W	1	Range: 1 – 120 Units: Min
554	Enable Charger controller	En ChrgCtler	-	-	-	R/W	R/W	1	
555	Restart Charger controller	Restart ChrgCtler	-	-	-	R/W	R/W	0	
556	Batttery Current Multiplier	Ibatt Multiplier	-	-	-	R/W	R/W	12	Range: 1 – 255
557	Offset amp hour at 1 C discharge rate	Offset AH Cap 1	-	-	-	R/W	R/W	22	Range: 0 – 255
558	Offset amp hour at 2 C discharge rate	Offset AH Cap 2	-	-	-	R/W	R/W	29	Range: 0 – 255
559	Offset amp hour at 3 C discharge rate	Offset AH Cap 3	-	-	-	R/W	R/W	36	Range: 0 – 255
560	Offset amp hour at 4 C discharge rate	Offset AH Cap 4	-	-	-	R/W	R/W	39	Range: 0 – 255
561	Battery Voltage at 1 C Discharge Rate	BattV at C Rate 1	-	-	-	R/W	R/W	120	Range: 1 – 255
562	Battery Voltage at 2 C Discharge Rate	BattV at C Rate 2	-	-	-	R/W	R/W	118	Range: 1 – 255
563	Battery Voltage at 3 C Discharge Rate	BattV at C Rate 3	-	-	-	R/W	R/W	114	Range: 1 – 255
564	Battery Voltage at 4 C Discharge Rate	BattV at C Rate 4	-	-	-	R/W	R/W	113	Range: 1 – 255
565	True Discharge Battery Capacity	True Discharge C	-	-	-	R/W	R/W	7500	Range: 1 – 36000 Units: mAh

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
566	Battery mAh In	Battery mAh In	-	-	-	R/W	R/W	0	Range: 1 – 36000 Units: mAh
567	Time to fully charge battery	Batt Charge Time	-	-	-	R/W	R/W	1440	Range: 1 – 10080 Units: Min
568	Milliamp hour lost in one month	mAh Lost Slope	-	-	-	R/W	R/W	38	Range: 0 – 9000 Units: mA/M
569	Total milliamp hour lost	Total mAh Lost	-	-	-	R/W	R/W	0	Range: 0 – 18000 Units: mAh
576	Battery Cabinet 1 Input Voltage	BC1 Vin	R	R	R	R	R	0	Units: 0.1 V
578	Battery Cabinet 1 Total Charge Current	BC1 Chg Current	R	R	R	R	R	0	Units: 0.1 A
579	Battery Cabinet 1 String 1 Current	BC1 String1 I	-	-	-	R	R	0	Display this variable based on UPS rating.
580	Battery Cabinet 1 String 2 Current	BC1 String2 I	-	-	-	R	R	0	Display this variable based on UPS rating.
581	Battery Cabinet 1 String 3 Current	BC1 String3 I	-	-	-	R	R	0	Display this variable based on UPS rating.
582	Battery Cabinet 1 Status	BC1 Status	R	R	R	R	R	0	Display this variable based on UPS rating.
585	Battery Cabinet 1 Ambient Temperature	BC1 AmbientTemp	R	R	R	R	R	0	Units: °C
586	Battery Cabinet 2 Input Voltage	BC2 Vin	R	R	R	R	R	0	Units: 0.1 V
588	Battery Cabinet 2 Total Charge Current	BC2 Chg Current	R	R	R	R	R	0	Units: 0.1 A
589	Battery Cabinet 2 String 1 Current	BC2 String1 I	-	-	-	R	R	0	Display this variable based on UPS rating.
590	Battery Cabinet 2 String 2 Current	BC2 String2 I	-	-	-	R	R	0	Display this variable based on UPS rating.
591	Battery Cabinet 2 String 3 Current	BC2 String3 I	-	-	-	R	R	0	Display this variable based on UPS rating.

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
592	Battery Cabinet 2 Status	BC2 Status	R	R	R	R	R	0	Display this variable based on UPS rating.
593	Battery Cabinet 2 Charger Votlage	BC2 Chg Volt	R	R	R	R	R	0	Display this variable based on UPS rating. Units: 0.1 V
595	Battery Cabinet 2 Ambient Temperature	BC2 AmbientTemp	R	R	R	R	R	0	Units: °C
570-2	Battery Cabinet 1 Serial Number	BC1 Serial No	R	R	R	R/W	R/W		
570-3	Battery Cabinet 1 Firmware Version	BC1 Fware	R	R	R	R	R		
570-5	Battery Cabinet 1 Hardware Version	BC1 Hardware	-	-	-	R/W	R/W		
570-6	Battery Cabinet 1 EEPROM Version	BC1 EEPROM	R	R	R	R	R		
570-7	Battery Cabinet 1 Install Date	Ins. Date BC1	R	R/W	R/W	R/W	R/W		
570-9	Battery Cabinet 2 Serial Number	BC2 Serial No	R	R	R	R/W	R/W		
570-10	Battery Cabinet 2 Firmware Version	BC2 Fware	R	R	R	R	R		
570-12	Battery Cabinet 2 Hardware Version	BC2 Hardware	-	-	-	R/W	R/W		
570-13	Battery Cabinet 2 EEPROM Version	BC2 EEPROM	R	R	R	R	R		
570-14	Battery Cabinet 2 Install Date	Ins. Date BC2	R	R/W	R/W	R/W	R/W		
571-2	Battery Cabinet Communication Mode	BC Comm Mode	-	-	-	R/W	R/W		Range: 0 – 4
571-3	Number of External Battery Cabinet	No Of Ext BC	-	-	-	R/W	R/W		Range: 0 – 3
571-4	Input Over Voltage Level	BC IP OV Lvl	-	-	R	R/W	R/W		Range: 0 – 5000
571-5	Charger Over Voltage Level	BC CH OV Lvl	-	-	R	R/W	R/W		Range: 0 – 4000

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
571-7	Ambient Over Temperature Level	Over Temp Lvl	-	-	R	R/W	R/W		Range: 0 – 100
571-8	Over Charge Current Level	Over Ch I Lvl	-	-	R	R/W	R/W		Range: 0 – 5000
571-9	Constant Voltage Detection Level	CV Detect Lv	-	-	R	R/W	R/W		Range: 0 – 4000
571-10	Constant Current Detection Level	CC Detect Lvl	-	-	R	R/W	R/W		Range: 0 – 4000
571-11	Number of Current Sense	No Of I Sense	R	R	R	R/W	R/W		Range: 0 – 4
571-12	Clear External Battery Cabinet Fault	Clr Ext BC Fault	-	-	R	R/W	R/W		Range: 0 – 5
572-2	Battery Cabinet 1 Input Voltage Calibration Factor	BC1 IP V GCali	-	-	R	R/W	R/W		Range: 0 – 5000
572-3	Battery Cabinet 1 Output Voltage Calibration Factor	BC1 OP V GCali	-	-	R	R/W	R/W		Range: 0 – 5000
572-4	Battery Cabinet 1 Total Charge Current Calibration Factor	BC1 Tot I GCali	-	-	R	R/W	R/W		Range: 0 – 1000
572-5	Battery Cabinet 1 Input Voltage offset Calibration	BC1 IP V Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-6	Battery Cabinet 1 Output Voltage offset Calibration	BC1 OP V Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-7	Battery Cabinet 1 Current offset Calibration	BC1 Tot I Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-8	Clear Battery Cabinet 1 Disconnect Warning	Clr BC1 DNC Wrn	R/W	R/W	R/W	R/W	R/W		
572-9	Constant Current Mode Charger Reference BC1	CC Mode Chg Ref	-	-	R	R/W	R/W		Range: 750 – 1024
572-10	Constant Voltage Mode Charger Reference BC1	CV Mode Chg Ref	-	-	R	R/W	R/W		Range: 540 – 1024
572-11	Battery Cabinet 2 Input Voltage Calibration Factor	BC2 IP V GCali	-	-	R	R/W	R/W		Range: 0 – 5000
572-12	Battery Cabinet 2 Output Voltage Calibration Factor	BC2 OP V GCali	-	-	R	R/W	R/W		Range: 0 – 5000

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
572-13	Battery Cabinet 2 Total Charge Current Calibration Factor	BC2 Tot I GCali	-	-	R	R/W	R/W		Range: 0 – 1000
572-14	Battery Cabinet 2 Input Voltage offset Calibration	BC2 IP V Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-15	Battery Cabinet 2 Output Voltage offset Calibration	BC2 OP V Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-16	Battery Cabinet 2 Current offset Calibration	BC2 Tot I Ocali	-	-	R	R/W	R/W		Range: -1000 – 1000
572-17	Clear Battery Cabinet 2 Disconnect Warning	Clr BC2 DNC Wrn	R/W	R/W	R/W	R/W	R/W		
752-18	Constant Current Mode Charger Reference BC2	CC Mode Chg Ref	-	-	R	R/W	R/W		Range: 750 – 1024
572-19	Constant Voltage Mode Charger Reference BC2	CV Mode Chg Ref	-	-	R	R/W	R/W		Range: 540 – 1024
601	System Temperature Control PCB's I2C Device	System(CTL) Temp	R	R	R	R	R	0	Thermostat on control PCB. Units: °C
602	Battery Temperature	Battery Temp	R	R	R	R	R	0	Thermistor attached to the case of battery tray. Units: °C
608	Current State of UPS	Current State	R	R	R	R	R		0: Shutdown [show Shutdown] 1: Initial Charge [show Shutdown] 2: Boostup [show Shutdown] 3: Normal (Online) [show Online] 4: Backup [show Backup] 5: Batttery Test [show Battery Test] 6: Bypass Normal [show Bypass] 7: Bypass Init [show Bypass] 8: Bypass Shutdown [show Bypass] 9: Startup [show Startup]
609	Operation Mode Transition State Requested	Requested State	R/W	R/W	R/W	R/W	R/W		1: Shutdown Request 2: Bypass Request 3: Online Request 4: Battery Test Request

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
610	Operation Mode Transition Timer	Timed Operation	R/W	R/W	R/W	R/W	R/W	0 Sec	The timer upon whose expiration a mode transition will be attempted by the system. Range: 0 – 800 Units: Sec
611	EPO Contact State	EPO Status	R	R	R	R	R		Report of EPO input contact status. 0: Open 1: Closed
612	UPS Faults	Faults	R/W	R/W	R/W	R/W	R/W		Only accept zero to clear Fault bit map
613	UPS Warnings	Warnings	R	R	R	R/W	R/W		Only accept zero to clear Warning bit map
614	UPS System Status	UPS Status(Comm)	R	R	R	R	R		LSW is attached at every data package. See the details of bit map UX3FN19 (Toshiba Communication Protocol (TUCP 2.0) for external Reference.doc
615	Run / Stop mechanical switch state	RunStop SW Status	R	R	R	R	R		0: Stop 1: Run
617	Service Port Communication Status	SPort Status	R	R	R	R	R	0	0: Unknown 1: Normal & OK 2: Idle – Off (Disable) 3: Error
618	Internal Communication Status	Inter Comm Status	R	R	R	R	R	0	0: Unknown 1: Normal & OK 2: Idle or Off (Disable) 3: Error
619	Security Level Control (Enter Password)	Security Level	R/W	R/W	R/W	R/W	R/W		Reading will give the current security level USER for User Level ADMIN for Administration Level DIST for Distrubutor Level QCNSRV for Qc and Service Level ENG for Engineering Level NOTE: Three communication chanels have their own security level variables
620	Manage Admin Password	Manage Admin PW	-	R/W	R/W	R/W	R/W	ADMIN	Change Admin Password
621	Reset Admin Password	Reset Admin PW	R/W	R/W	R/W	R/W	R/W	0	0 = do nothing 1 = reset administration password

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
623	Bypass Enable*	En Bypass*	-	-	-	R/W	R/W	1: Enabled	DIP Switch, EEPROM's Enable CVCF, and this value will decide the system's bypass availability (Restart Required) 0: Disable 1: Enable
624	Enable Transfer to Bypass while in Async mode	En Asyn Byp	-	-	-	R/W	R/W	1: Enable	When Disabled, the UPS will not prevent transfers to bypass mode during periods when the frequencies are out of synch. 0: Disable 1: Enable
625	Enable CVCF*	En CVCF*	-	-	-	R/W	R/W		Constant Voltage, Constant Frequency Mode (Restart Required) 0: Disable 1: Enable
626	CVCF Output Frequency*	CVCF Frequency*	-	-	-	R/W	R/W	6000	500 or 600 Only. Other values will default to 500 Systems. (Restart Required) Units: 0.1 Hz
634	System Date	UPS Date	R/W	R/W	R/W	R/W	R/W		Depends on which protocol is used. SNMP serial link and CAN communication – 1st Byte -> Day of Week (1 = Sunday, 2 = Monday, …, 7 = Saturday) 2nd Byte -> Date 3rd Byte -> Month 4th Byte -> Year (without 2000) Hyper terminal -> "DOW MM/DD/YYYY"
635	System Time	UPS Time	R/W	R/W	R/W	R/W	R/W		Depends on which protocol is used. SNMP serial link and CAN communication – 1st Byte -> Hour 2nd Byte -> Minute 3rd Byte -> Second see the related document. Hyper terminal -> "HH:MM:SS"
636	System Timestamp	Timestamp	R	R	R	R	R		Current system timestamp (32 bits format)

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
637	Enable Inverter / Bypass command from REYE	En Reye UPS Ctl	R	R/W	R/W	R/W	R/W	1: Enabled	RemotEye is allowed to switch UPS Inverter to/From Bypass or not! 0: Diable 1: Enable
639	Enable Startup Delay*	En Startup Delay*	R	R/W	R/W	R/W	R/W	0: Disabled	Delay Timer enable or disable during Normal startup (Not Shutdown by battery or Not LAN Shutdown), (Restart Required) 0: Disable 1: Enable
640	Startup Mode (Bypass or Inverter)*	Startup Mode*	R	R/W	R/W	R/W	R/W	0: Bypass	The Operation Mode into which the UPS will transition at expiration of the Start Up Delay timer (when enabled). (Restart Required) 0: Bypass 1: Online Any other value besides 0 and 1 will be considered Shutdown
641	Startup Delay Timer Value*	Startup Delay*	R	R/W	R/W	R/W	R/W	0	(Restart Required) Range: 0 – 800 Units: Sec
644	Remote 'Shutdown' Contact State	Remote SD Status	R	R	R	R	R	0	0: Open (deactivated) 1: Closed (activated)
645	Remote 'Shutdown' Contact Mode Selection	Mode of Rmt SDown	R	R/W	R/W	R/W	R/W	0: Bypass	0: Bypass state 1: Shutdown state while contact is closed. Return to previous state when contact is open.
646	Enable LAN Shutdown	En DCntct LANSD	R	R/W	R/W	R/W	R/W	1: Enable	
647	LAN Shutdown Signal Permitted Time Window	DCntct LANSD Wndw	R	R/W	R/W	R/W	R/W	600	Range: 0 – 800 Units: Sec
648	Remote 'On Batteries' Delay Timer	BK DContact Delay	R	R/W	R/W	R/W	R/W	10	Delay timer between actual event occurrence and dry contact closure to signal external devices of the event. Range: 0 – 800 Units: Sec
649	Remote 'Low Battery' Delay Timer	LB DContact Delay	R	R/W	R/W	R/W	R/W	0	Delay timer between actual event occurrence and dry contact closure to signal external devices of the event. Range: 0 – 800 Units: Sec

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
652	Enable Battery Test on UPS Startup*	En Batt Test Sup*	R	R/W	R/W	R/W	R/W	0: Disabled	Forces a battery test when UPS starts after normal shutdown. (Restart Required) 0: Disable 1: Enable
653	Enable Battery Test*	En Batt Test*	R	R/W	R/W	R/W	R/W	1: Enabled	(Restart Required) 0: Disable 1: Enable
654	Battery Test Condition Status	Batt Test Cond.	R	R	R	R	R	0	0 = Battery test prohibited because of battery test interval setup 1 = Battery test OK to perform
655	Battery Test Frequency	Batt Test Freq	R	R/W	R/W	R/W	R/W	2: Monthly	allow 0: only daily 1: only weekly 2: only monthly (Default for other values)
656	System Temperature Compensation	Sys. Temp. Comp.	-	-	-	R/W	R/w	-5	Range: -20 – 20 Units: °C
657	Service Port Mode	Service Port Mode	-	-	-	R/W	R/W	1: Protocol Rqrd.	0: Terminal mode (no handshake, no error check) 1: Toshiba UPS Communication Protocol 2-0 mode
658	Enable Restart (After Battery Shutdown)	En Restart	R	R/W	R/W	R/W	R/W	1: Enable	
659	Restart Delay (After Battery Shutdown)	Restart Delay	R	R/W	R/W	R/W	R/W	10 Sec	Range: 0 – 800 Units: Sec
660	Enable Auto Transfer (Current Limit)	En AutoXfer	R	R/W	R/W	R/W	R/W	1: Enabled	0 = keep inverter, 1 = go to bypass and come back to inverter after time delay CMD662
662	Auto ReTransfer Delay (Current Limit)	AutoReXfer Window	R	R/W	R/W	R/W	R/W	3 Sec	Time period to wait after current limit occurrence before attempting tranfer back Online. Range: 0 – 600 Units: Sec
663	Service Port Baud Rate Settings*	Srv Port Baud*	R	R/W	R/W	R/W	R/W	3	no hardware control, no parity, 1 stop bit, 8 bits of data and baud rate are (Restart Required) 0: 9600 1: 19200 2: 38400 3: 57600

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
680	All EEPROM Reload*	Reload All EE*	-	-	-	R/W	R/W	0	0 = do nothing 1 = reload all EEPROM with ROM DEFAULT 2 = reload CFG and STR types with ROM DEFAULT
681	SNMP Port Mode	SNMP Port Mode	-	-	-	R/W	R/W	1: Protocol Rqrd.	0: Terminal mode (no handshake, no error check) 1: Toshiba UPS Communication Protocol 2-0 mode
682	Fault Clear counter	Flt Cleared Cnt	R	R	R	R/W	R/W	0	
683	Fault Clear Mask Low	Flt Clear Mask Lo	-	-	-	R/W	R/W	0x0000	Range: 0x0000 – 0xFFFF Units: Hex
684	Fault Clear Mask High	Flt Clear Mask Hi	-	-	-	R/W	R/W	0x0000	Range: 0x0000 – 0xFFFF Units: Hex
685	Total Faults Allowed	Total Flt Allowed	-	-	-	R/W	R/W	10	Range: 0 – 255
686	Fault Disable Time	Flt Dis Time	-	-	-	R/W	R/W	10	Range: 0 – 255 Units: Min
687	Fault Disable Countdown Timer	Flt Dis Cdown Tmr	R	R	R	R	R	0	Units: Sec
693	Remote Shutdown inverted logic	Invert Rmt SDown	R	R/W	R/W	R/W	R/W	0	0: Not Inverted 1: Inverted
694	Reset Hardware Fault Latch	Reset HW Fault	-	-	-	R/W	R/W	0	0 = Do Nothing 1 = Reset Fault Hardware
695	Restart Mode*	Restart Mode*	R	R/W	R/W	R/W	R/W	1	0: Bypass 1: Online Any other value besides 0 and 1 will be considered Shutdown (Restart Required)
696	Software Mishap restart mode	SWMishap Mrstrt	-	-	-	R/W	R/W	1	
697	Enable DMX	En DMX	-	R/W	R/W	R/W	R/W	0	
701	System Operation Time	System Op Time	R	R	R	R/W	R/W	0	Units: Sec
702	Inverter Operation Time	Inverter Op Time	R	R	R	R/W	R/W	0	Units: Sec
703	Backup Operation Time	Backup Op Time	R	R	R	R/W	R/W	0	Units: Sec

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
704	UPS Lifetime Remaining	UPS Lifetime	R	R	R	R/W	R/W	61320	Range: 0 – 61320 Units: Hrs
705	Peak (Highest) system Temperature	Hi System Temp	R	R	R	R/W	R/W	0	Units: °C
706	Peak (Highest) battery Temperature	Hi Battery Temp	R	R	R	R/W	R/W	-15	Range: -15 – 0 Units: °C
707	No. of Input Under Voltage	Total VIUVs	R	R	R	R/W	R/W	0	
708	No. of Overloads	Total OLs	R	R	R	R/W	R/W	0	
709	No. of Tests	Total Tests	R	R	R	R/W	R/W	0	Clear records with write of "0"
710	Test Records	Test Record	R	R	R	R	R	0	
711	No. of Backups	Total Backups	R	R	R	R/W	R/W	0	Clear records with write of "0"
712	Backup Records	Backup Record	R	R	R	R	R	0	
713	No. of Faults	Total Faults	R	R	R	R/W	R/W	0	Clear records with write of "0"
714	Fault Records Access	Fault Record	R	R	R	R	R	0	
715	No. of Operation Mode changes	Total Operations	R	R	R	R/W	R/W	0	Clear records with write of "0"
716	Operation Mode Changes Records	Operation Record	R	R	R	R	R	0	
719	No. of Warnings	Total Warnings	R	R	R	R/W	R/W	0	Clear records with write of "0"
720	UPS Warning Records	Warning Record	R	R	R	R	R	0	
721	No. of System Settings Changes	Total Sys Change	R	R	R	R/W	R/W	0	Clear records with write of "0"
722	System Settings Change Records	Sys Change Record	R	R	R	R	R	0	
723	Shutdown by Battery*	Shutdown by Batt*	-	-	-	-	R/W	0	(Restart Required)
725	No. Total resets	Total Resets	R	R	R	R/W	R/W	0	
726	Reset Record	Reset Record	R	R	R	R	R	0	

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
801	Display Firmware Version	DFW Ver	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	"UH3DFV01000"	UXXYFVMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) FV – Firmware Version MM – Major version RRR – Minor version Note: Only display can write. Others, read only.
802	Display Firmware Built Date	DFW BDate	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)		Mmm DD, YYYY (Ex. Jan 04, 2006 Automatically read by compiler) Note: Only display can write. Others, read only.
803	Display Firmware Built Time	DFW BTime	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)		HH:MM:SS (Ex. 18:45:45 Automatically read by compiler) Note: Only display can write. Others, read only.
804	Display Boot Sector Version	DBS Ver	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	"UH3DBS01000"	UXXYBSMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) BS – Boot Sector MM – Major version RRR – Minor version Note: Only display can write. Others, read only.
805	Display Boot Loader Version	DBL Ver	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	"UH3DBL01000"	UXXYBLMMRRR U – UPS XX – 2 Alpha Numeric UPS Product Line (F3, H3) Y – uC Projects (M – Main, S – Sub, D – Display) BL – Bootloader Version MM – Major version RRR – Minor version Note: Only display can write. Others, read only.
806	Backlight Status	Sblight	R	R	R	R	R	0	
807	Display Sleep Timer	TMRsleep	R/W	R/W	R/W	R/W	R/W	3	Range: 0 – 60 Units: Min
808	Buzzer Mode	En Buzzer	R/W	R/W	R/W	R/W	R/W	1	0: Disable 1: Enable

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
809	Buzzer Status	Sbuzzer	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	0: Off	0: Off 1: On Note: Only display can write. Others, read only.
810	Enable Display Calibration	Cali Disp	R/W	R/W	R/W	R/W	R/W	0: Disabled	0 : Disabled 1 : Enabled Note: Only display can write. Others, read only.
811	P1X Calibration Data	P1X Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	29372	Range: 0 – 65535
812	P1Y Calibration Data	P1Y Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	29598	Range: 0 – 65535
813	P2X Calibration Data	P2X Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	3906	Range: 0 – 65535
814	P2Y Calibration Data	P2Y Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	29798	Range: 0 – 65535
815	P3X Calibration Data	P3X Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	3922	Range: 0 – 65535
816	P3Y Calibration Data	P3Y Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	3038	Range: 0 – 65535

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
817	P4X Calibration Data	P4X Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	29286	Range: 0 – 65535
818	P4Y Calibration Data	P4Y Cali	(W by Disp Only)	(W by Disp Only)	(W by Disp Only)	R/(W by Disp Only)	R/(W by Disp Only)	3028	Range: 0 – 65535
819[1]	Language	Language	R/W	R/W	R/W	R/W	R/W		(Restart Required)
821	1st time startup	1st Startup	-	R/W	R/W	R/W	R/W	1	
822	Buzzer silent	Buzzer Silent	-	-	-	R/W	R/W	0	
823	Disp Watch Dog	Disp Watch Kick	-	-	-	R	R	0	
824	Enable Warning LED	En Wrn LED Blink	R/W	R/W	R/W	R/W	R/W	0	
826	En LB Flt Led	En LB Flt Led	R/W	R/W	R/W	R/W	R/W		
830	Test Mode	Test Mode	-	-	-	R/W	R/W	0	Range: 0 – 65535
831	LCD Test Mode	En LCD Test	-	-	-	R/W	R/W	0	
832	Buzzer Test Mode	En Buzz Test	-	-	-	R/W	R/W	0	
833	Backlight Test Mode	En Blight Test	-	-	-	R/W	R/W	0	
839	Test Result	Test Result	R/W	R/W	R/W	R/W	R/W		
840	Display Debug Info	Disp DBG Info	-	-	-	R/W	R/W	0	Range: 0 – 65535
850	RemotEye Installation Date	RMTI Ins Dat	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R	"20080101"	YYYYMMDD Note: Only SNMP can write. Others, read only.
851	RemotEye Version	RMTI Ver	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R		Note: Only SNMP can write. Others, read only.
852	RemotEye IP Address	RMTI IP	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R		Ex. "10.128.33.5" Cfg. Of RE parms can be done via re comm.port Note: Only SNMP can write. Others, read only.

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Item	Brief Description	Description On LCD	U	A	D	Svc/ QC	F	Default	Remark
853	RemotEye Network Mask Address	RMTI Mask IP	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R		Ex. “255.0.0.0” Note: Only SNMP can write. Others, read only.
854	RemotEye Gateway Address	RMTI Gway IP	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R		Ex. “10.128.33.1” Note: Only SNMP can write. Others, read only.
855	RemotEye Installation Status	SRMTI	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R	0	Note: Only SNMP can write. Others, read only.
856	SNMP Port’s Baud Rate Setting*	RMTI Baud *	R	R/W	R/W	R/W	R/W	3	no hardware control, no parity, 1 stop bit, 8 bits of data (Restart Required) baud rate 0: 9600 1: 19200 2: 38400 3: 57600
857	RemotEye Data Link Status	RMTI Datlink	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R	0	0: Unknown 1: Link Down 2: Link Up Note: Only SNMP can write. Others, read only.
858	RemotEye Network Link Status	SRMTI Netlink	R/ (W by SNMP Only)	R/ (W by SNMP Only)	R	R	R	0	0: Unknown 1: Link Down 2: Link Up Note: Only SNMP can write. Others, read only.

* - Changing parameter requires restarting Unit.
1 - Command Parameters 522, 523, and 819 are only accessible to control board firmware version 1.05 and above. If the commands are visible in the display but the user receives an error when trying to write, the control board firmware is a version earlier version that does not support these three commands.

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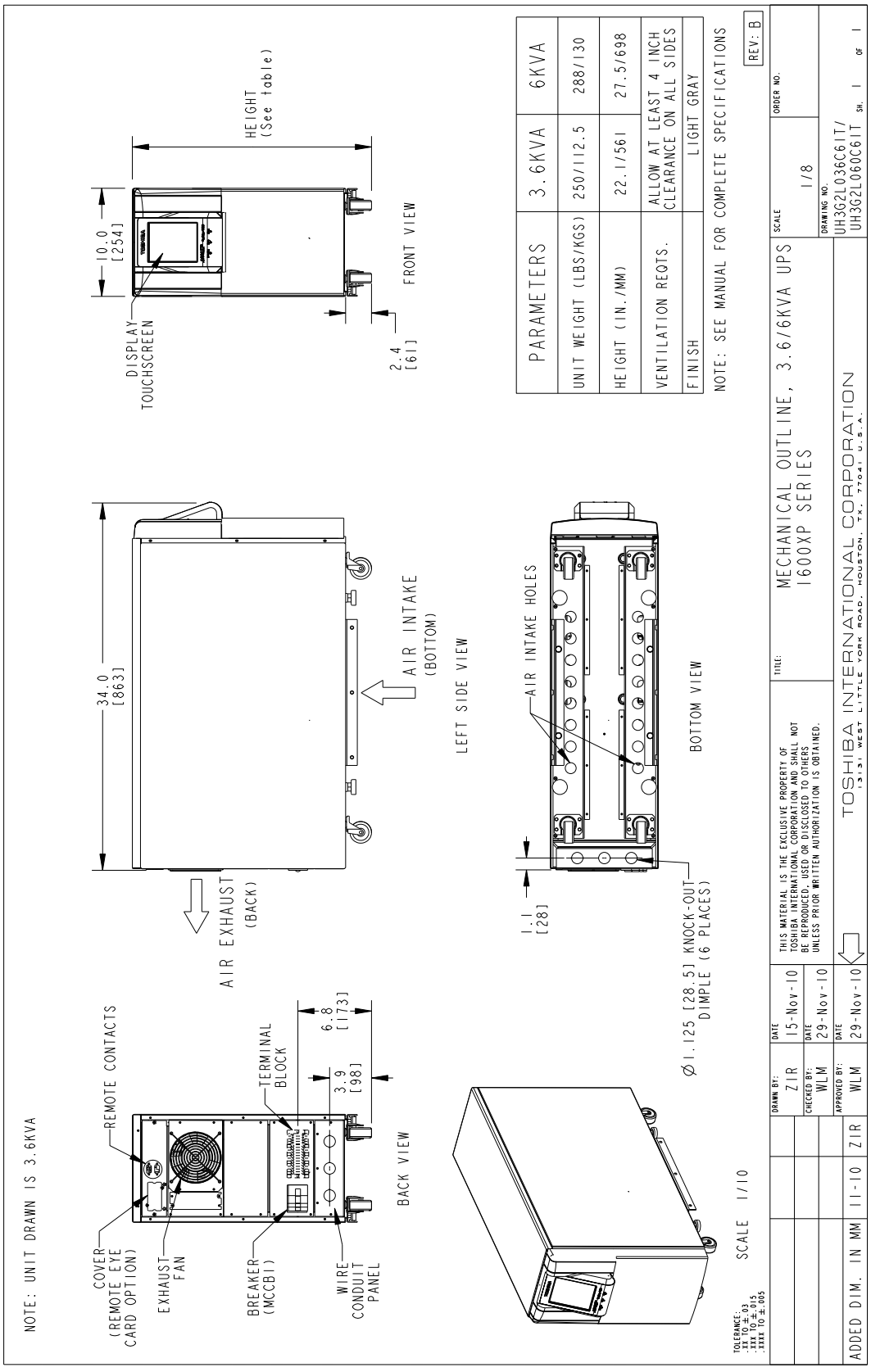
Appendix C: 1600XP/1600XPi Dimensions and Weights

3.6 – 6 kVA Dimensions



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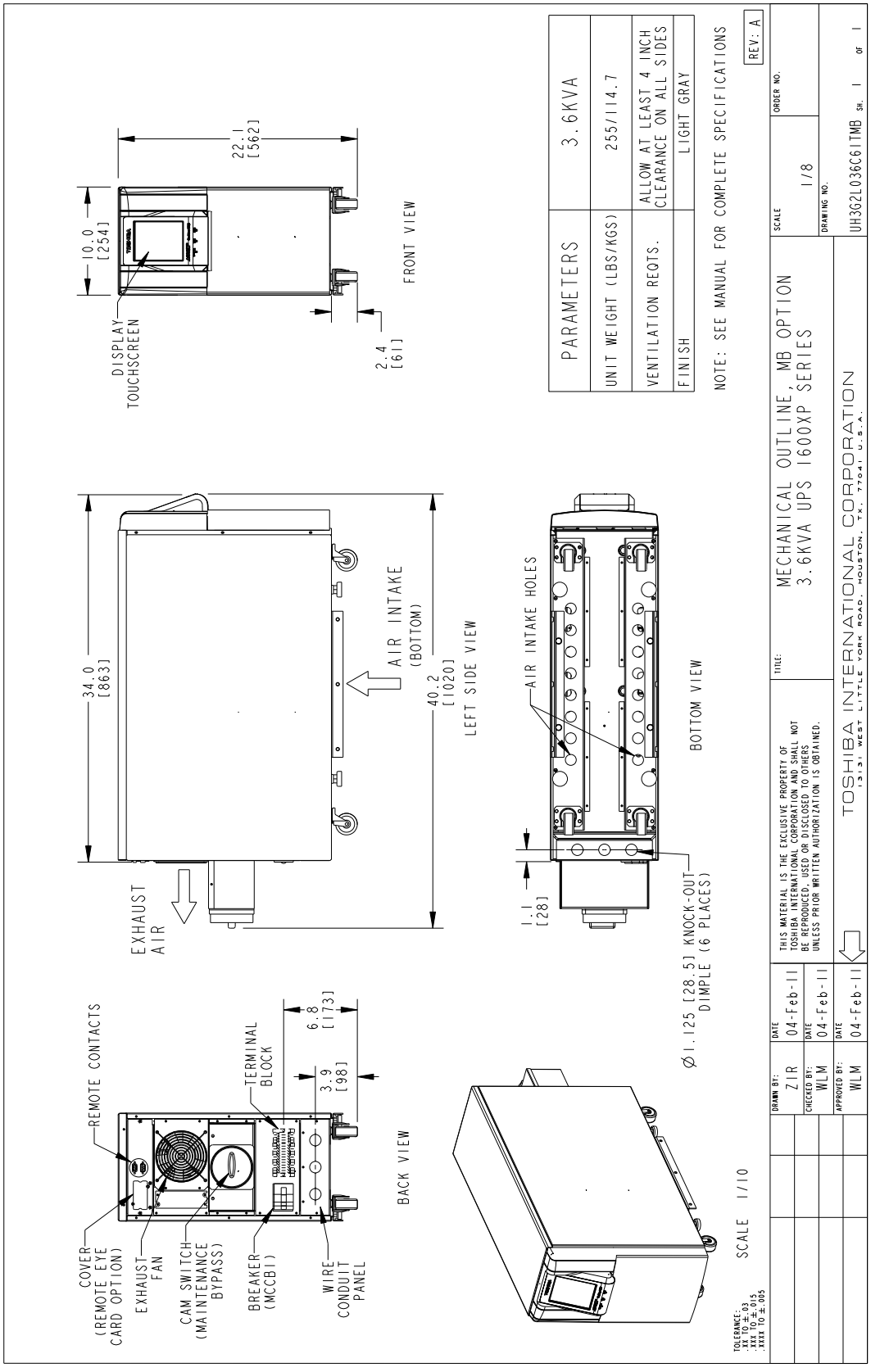
3.6 – 6 kVA Dimensions (w/ Optional MBS)



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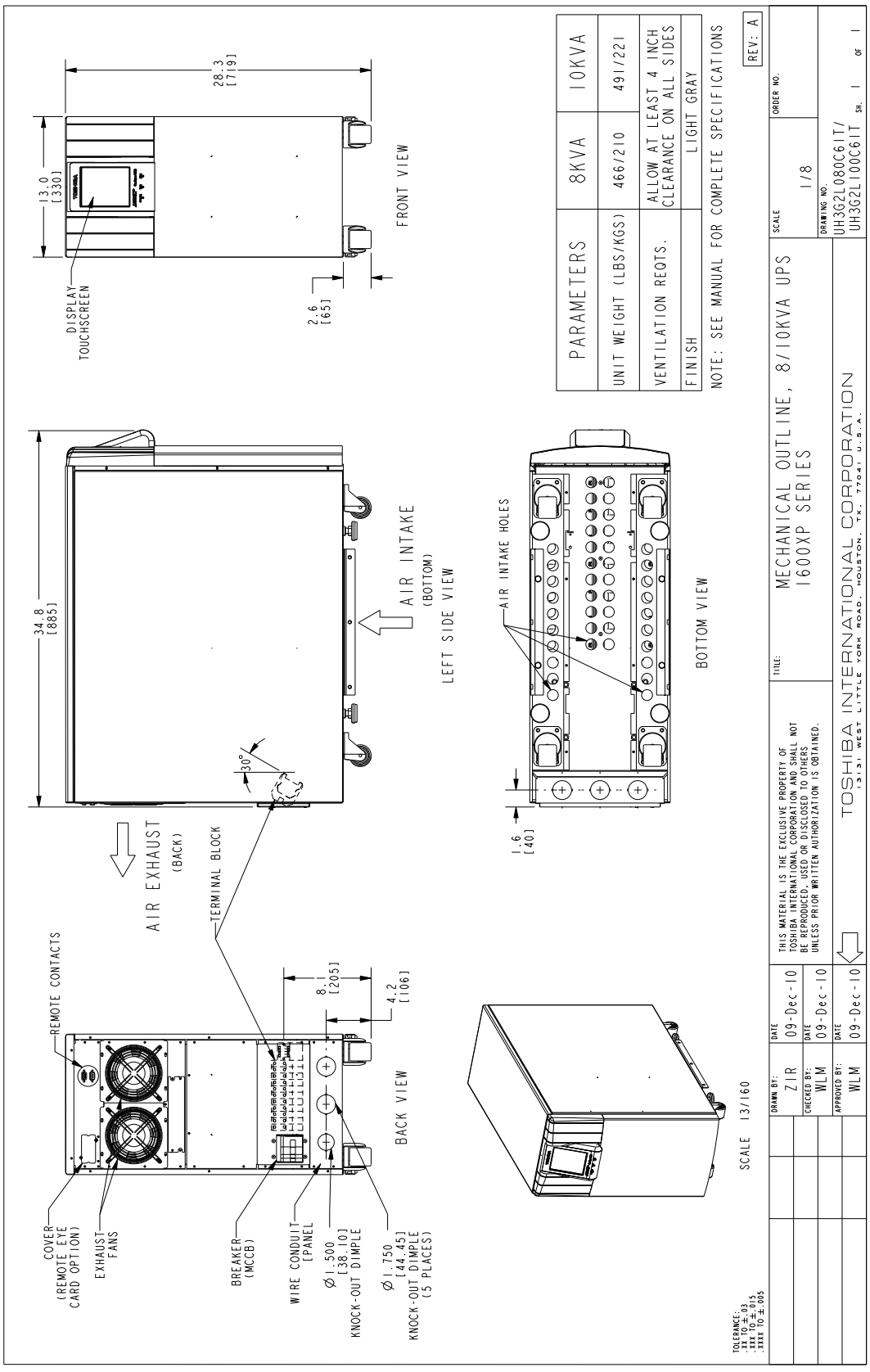
8 – 10 kVA Dimensions



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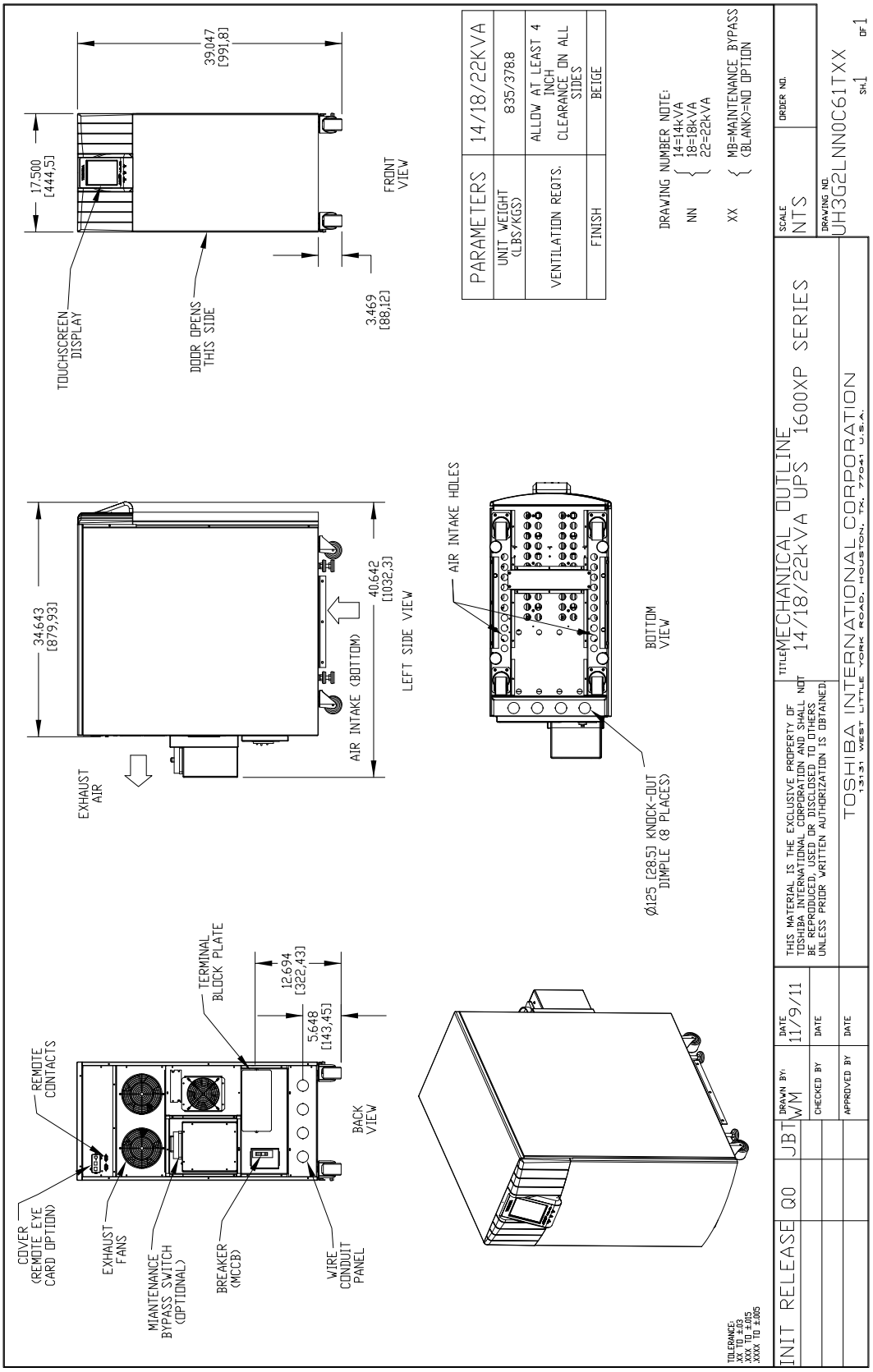
14 – 22 kVA Dimensions (w/ Optional MBS)



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Appendix D: Battery Backup Tables (Internal & External Battery Cabinets)

3.6kVA – UH3G2L036C61T / H3BG2L036C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.7	240	15.00	0.10	252	12	1	144	82
3.6	0.7	240	15.00	0.20	504	12	1	144	53
3.6	0.7	240	15.00	0.30	756	12	1	144	40
3.6	0.7	240	15.00	0.40	1008	12	1	144	29
3.6	0.7	240	15.00	0.50	1260	12	1	144	22
3.6	0.7	240	15.00	0.60	1512	12	1	144	18
3.6	0.7	240	15.00	0.70	1764	12	1	144	16
3.6	0.7	240	15.00	0.80	2016	12	1	144	12
3.6	0.7	240	15.00	0.90	2268	12	1	144	11
3.6	0.7	240	15.00	1.00	2520	12	1	144	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.7	240	15.00	0.10	252	12	4	144	240
3.6	0.7	240	15.00	0.20	504	12	4	144	165
3.6	0.7	240	15.00	0.30	756	12	4	144	135
3.6	0.7	240	15.00	0.40	1008	12	4	144	105
3.6	0.7	240	15.00	0.50	1260	12	4	144	90
3.6	0.7	240	15.00	0.60	1512	12	4	144	82
3.6	0.7	240	15.00	0.70	1764	12	4	144	72
3.6	0.7	240	15.00	0.80	2016	12	4	144	65
3.6	0.7	240	15.00	0.90	2268	12	4	144	57
3.6	0.7	240	15.00	1.00	2520	12	4	144	53
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.7	240	15.00	0.10	252	12	7	144	300
3.6	0.7	240	15.00	0.20	504	12	7	144	300
3.6	0.7	240	15.00	0.30	756	12	7	144	180
3.6	0.7	240	15.00	0.40	1008	12	7	144	165
3.6	0.7	240	15.00	0.50	1260	12	7	144	150
3.6	0.7	240	15.00	0.60	1512	12	7	144	120
3.6	0.7	240	15.00	0.70	1764	12	7	144	112
3.6	0.7	240	15.00	0.80	2016	12	7	144	105
3.6	0.7	240	15.00	0.90	2268	12	7	144	98
3.6	0.7	240	15.00	1.00	2520	12	7	144	86

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.85	240	15.00	0.10	306	12	1	144	72
3.6	0.85	240	15.00	0.20	612	12	1	144	48
3.6	0.85	240	15.00	0.30	918	12	1	144	33
3.6	0.85	240	15.00	0.40	1224	12	1	144	23
3.6	0.85	240	15.00	0.50	1530	12	1	144	18
3.6	0.85	240	15.00	0.60	1836	12	1	144	14
3.6	0.85	240	15.00	0.70	2142	12	1	144	12
3.6	0.85	240	15.00	0.80	2448	12	1	144	10
3.6	0.85	240	15.00	0.90	2754	12	1	144	9
3.6	0.85	240	15.00	1.00	3060	12	1	144	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.85	240	15.00	0.10	306	12	4	144	240
3.6	0.85	240	15.00	0.20	612	12	4	144	150
3.6	0.85	240	15.00	0.30	918	12	4	144	112
3.6	0.85	240	15.00	0.40	1224	12	4	144	98
3.6	0.85	240	15.00	0.50	1530	12	4	144	82
3.6	0.85	240	15.00	0.60	1836	12	4	144	70
3.6	0.85	240	15.00	0.70	2142	12	4	144	60
3.6	0.85	240	15.00	0.80	2448	12	4	144	55
3.6	0.85	240	15.00	0.90	2754	12	4	144	50
3.6	0.85	240	15.00	1.00	3060	12	4	144	45
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
3.6	0.85	240	15.00	0.10	306	12	7	144	300
3.6	0.85	240	15.00	0.20	612	12	7	144	240
3.6	0.85	240	15.00	0.30	918	12	7	144	180
3.6	0.85	240	15.00	0.40	1224	12	7	144	150
3.6	0.85	240	15.00	0.50	1530	12	7	144	120
3.6	0.85	240	15.00	0.60	1836	12	7	144	112
3.6	0.85	240	15.00	0.70	2142	12	7	144	98
3.6	0.85	240	15.00	0.80	2448	12	7	144	90
3.6	0.85	240	15.00	0.90	2754	12	7	144	82
3.6	0.85	240	15.00	1.00	3060	12	7	144	72

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6kVA – UH3G2L060C61T / H3BG2L060C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.7	240	25.00	0.10	420	18	1	216	90
6	0.7	240	25.00	0.20	840	18	1	216	55
6	0.7	240	25.00	0.30	1260	18	1	216	40
6	0.7	240	25.00	0.40	1680	18	1	216	28
6	0.7	240	25.00	0.50	2100	18	1	216	21
6	0.7	240	25.00	0.60	2520	18	1	216	16
6	0.7	240	25.00	0.70	2940	18	1	216	14
6	0.7	240	25.00	0.80	3360	18	1	216	11
6	0.7	240	25.00	0.90	3780	18	1	216	10
6	0.7	240	25.00	1.00	4200	18	1	216	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.7	240	25.00	0.10	420	18	3	216	180
6	0.7	240	25.00	0.20	840	18	3	216	135
6	0.7	240	25.00	0.30	1260	18	3	216	105
6	0.7	240	25.00	0.40	1680	18	3	216	86
6	0.7	240	25.00	0.50	2100	18	3	216	70
6	0.7	240	25.00	0.60	2520	18	3	216	60
6	0.7	240	25.00	0.70	2940	18	3	216	53
6	0.7	240	25.00	0.80	3360	18	3	216	46
6	0.7	240	25.00	0.90	3780	18	3	216	43
6	0.7	240	25.00	1.00	4200	18	3	216	38
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.7	240	25.00	0.10	420	18	5	216	300
6	0.7	240	25.00	0.20	840	18	5	216	180
6	0.7	240	25.00	0.30	1260	18	5	216	150
6	0.7	240	25.00	0.40	1680	18	5	216	120
6	0.7	240	25.00	0.50	2100	18	5	216	105
6	0.7	240	25.00	0.60	2520	18	5	216	90
6	0.7	240	25.00	0.70	2940	18	5	216	82
6	0.7	240	25.00	0.80	3360	18	5	216	72
6	0.7	240	25.00	0.90	3780	18	5	216	65
6	0.7	240	25.00	1.00	4200	18	5	216	60

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.85	240	25.00	0.10	510	18	1	216	82
6	0.85	240	25.00	0.20	1020	18	1	216	48
6	0.85	240	25.00	0.30	1530	18	1	216	32
6	0.85	240	25.00	0.40	2040	18	1	216	22
6	0.85	240	25.00	0.50	2550	18	1	216	16
6	0.85	240	25.00	0.60	3060	18	1	216	13
6	0.85	240	25.00	0.70	3570	18	1	216	11
6	0.85	240	25.00	0.80	4080	18	1	216	9
6	0.85	240	25.00	0.90	4590	18	1	216	8
6	0.85	240	25.00	1.00	5100	18	1	216	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.85	240	25.00	0.10	510	18	3	216	180
6	0.85	240	25.00	0.20	1020	18	3	216	120
6	0.85	240	25.00	0.30	1530	18	3	216	90
6	0.85	240	25.00	0.40	2040	18	3	216	72
6	0.85	240	25.00	0.50	2550	18	3	216	60
6	0.85	240	25.00	0.60	3060	18	3	216	51
6	0.85	240	25.00	0.70	3570	18	3	216	45
6	0.85	240	25.00	0.80	4080	18	3	216	40
6	0.85	240	25.00	0.90	4590	18	3	216	35
6	0.85	240	25.00	1.00	5100	18	3	216	30
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
6	0.85	240	25.00	0.10	510	18	5	216	300
6	0.85	240	25.00	0.20	1020	18	5	216	180
6	0.85	240	25.00	0.30	1530	18	5	216	135
6	0.85	240	25.00	0.40	2040	18	5	216	112
6	0.85	240	25.00	0.50	2550	18	5	216	90
6	0.85	240	25.00	0.60	3060	18	5	216	82
6	0.85	240	25.00	0.70	3570	18	5	216	70
6	0.85	240	25.00	0.80	4080	18	5	216	63
6	0.85	240	25.00	0.90	4590	18	5	216	55
6	0.85	240	25.00	1.00	5100	18	5	216	51

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8kVA – UH3G2L080C61T / H3BG2L080C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.7	240	33.33	0.10	560	24	1	288	105
8	0.7	240	33.33	0.20	1120	24	1	288	60
8	0.7	240	33.33	0.30	1680	24	1	288	43
8	0.7	240	33.33	0.40	2240	24	1	288	30
8	0.7	240	33.33	0.50	2800	24	1	288	22
8	0.7	240	33.33	0.60	3360	24	1	288	17
8	0.7	240	33.33	0.70	3920	24	1	288	14
8	0.7	240	33.33	0.80	4480	24	1	288	12
8	0.7	240	33.33	0.90	5040	24	1	288	10
8	0.7	240	33.33	1.00	5600	24	1	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.7	240	33.33	0.10	560	24	4	288	300
8	0.7	240	33.33	0.20	1120	24	4	288	180
8	0.7	240	33.33	0.30	1680	24	4	288	150
8	0.7	240	33.33	0.40	2240	24	4	288	120
8	0.7	240	33.33	0.50	2800	24	4	288	98
8	0.7	240	33.33	0.60	3360	24	4	288	86
8	0.7	240	33.33	0.70	3920	24	4	288	72
8	0.7	240	33.33	0.80	4480	24	4	288	65
8	0.7	240	33.33	0.90	5040	24	4	288	57
8	0.7	240	33.33	1.00	5600	24	4	288	53
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.7	240	33.33	0.10	560	24	7	288	300
8	0.7	240	33.33	0.20	1120	24	7	288	300
8	0.7	240	33.33	0.30	1680	24	7	288	300
8	0.7	240	33.33	0.40	2240	24	7	288	180
8	0.7	240	33.33	0.50	2800	24	7	288	165
8	0.7	240	33.33	0.60	3360	24	7	288	135
8	0.7	240	33.33	0.70	3920	24	7	288	120
8	0.7	240	33.33	0.80	4480	24	7	288	105
8	0.7	240	33.33	0.90	5040	24	7	288	98
8	0.7	240	33.33	1.00	5600	24	7	288	90

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.85	240	33.33	0.10	680	24	1	288	86
8	0.85	240	33.33	0.20	1360	24	1	288	50
8	0.85	240	33.33	0.30	2040	24	1	288	33
8	0.85	240	33.33	0.40	2720	24	1	288	23
8	0.85	240	33.33	0.50	3400	24	1	288	16
8	0.85	240	33.33	0.60	4080	24	1	288	14
8	0.85	240	33.33	0.70	4760	24	1	288	11
8	0.85	240	33.33	0.80	5440	24	1	288	9
8	0.85	240	33.33	0.90	6120	24	1	288	8
8	0.85	240	33.33	1.00	6800	24	1	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.85	240	33.33	0.10	680	24	4	288	300
8	0.85	240	33.33	0.20	1360	24	4	288	180
8	0.85	240	33.33	0.30	2040	24	4	288	120
8	0.85	240	33.33	0.40	2720	24	4	288	105
8	0.85	240	33.33	0.50	3400	24	4	288	82
8	0.85	240	33.33	0.60	4080	24	4	288	70
8	0.85	240	33.33	0.70	4760	24	4	288	60
8	0.85	240	33.33	0.80	5440	24	4	288	53
8	0.85	240	33.33	0.90	6120	24	4	288	48
8	0.85	240	33.33	1.00	6800	24	4	288	44
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
8	0.85	240	33.33	0.10	680	24	7	288	300
8	0.85	240	33.33	0.20	1360	24	7	288	300
8	0.85	240	33.33	0.30	2040	24	7	288	240
8	0.85	240	33.33	0.40	2720	24	7	288	165
8	0.85	240	33.33	0.50	3400	24	7	288	135
8	0.85	240	33.33	0.60	4080	24	7	288	120
8	0.85	240	33.33	0.70	4760	24	7	288	105
8	0.85	240	33.33	0.80	5440	24	7	288	90
8	0.85	240	33.33	0.90	6120	24	7	288	82
8	0.85	240	33.33	1.00	6800	24	7	288	72

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10kVA – UH3G2L100C61T / H3BG2L100C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.7	240	41.67	0.10	700	24	1	288	86
10	0.7	240	41.67	0.20	1400	24	1	288	50
10	0.7	240	41.67	0.30	2100	24	1	288	32
10	0.7	240	41.67	0.40	2800	24	1	288	22
10	0.7	240	41.67	0.50	3500	24	1	288	16
10	0.7	240	41.67	0.60	4200	24	1	288	13
10	0.7	240	41.67	0.70	4900	24	1	288	10
10	0.7	240	41.67	0.80	5600	24	1	288	9
10	0.7	240	41.67	0.90	6300	24	1	288	8
10	0.7	240	41.67	1.00	7000	24	1	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.7	240	41.67	0.10	700	24	4	288	300
10	0.7	240	41.67	0.20	1400	24	4	288	180
10	0.7	240	41.67	0.30	2100	24	4	288	120
10	0.7	240	41.67	0.40	2800	24	4	288	98
10	0.7	240	41.67	0.50	3500	24	4	288	82
10	0.7	240	41.67	0.60	4200	24	4	288	70
10	0.7	240	41.67	0.70	4900	24	4	288	60
10	0.7	240	41.67	0.80	5600	24	4	288	53
10	0.7	240	41.67	0.90	6300	24	4	288	48
10	0.7	240	41.67	1.00	7000	24	4	288	43
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.7	240	41.67	0.10	700	24	7	288	300
10	0.7	240	41.67	0.20	1400	24	7	288	300
10	0.7	240	41.67	0.30	2100	24	7	288	240
10	0.7	240	41.67	0.40	2800	24	7	288	165
10	0.7	240	41.67	0.50	3500	24	7	288	135
10	0.7	240	41.67	0.60	4200	24	7	288	112
10	0.7	240	41.67	0.70	4900	24	7	288	98
10	0.7	240	41.67	0.80	5600	24	7	288	90
10	0.7	240	41.67	0.90	6300	24	7	288	82
10	0.7	240	41.67	1.00	7000	24	7	288	72

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.85	240	41.67	0.10	850	24	1	288	72
10	0.85	240	41.67	0.20	1700	24	1	288	42
10	0.85	240	41.67	0.30	2550	24	1	288	25
10	0.85	240	41.67	0.40	3400	24	1	288	17
10	0.85	240	41.67	0.50	4250	24	1	288	12
10	0.85	240	41.67	0.60	5100	24	1	288	10
10	0.85	240	41.67	0.70	5950	24	1	288	9
10	0.85	240	41.67	0.80	6800	24	1	288	7
10	0.85	240	41.67	0.90	7650	24	1	288	5
10	0.85	240	41.67	1.00	8500	24	1	288	5
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.85	240	41.67	0.10	850	24	4	288	300
10	0.85	240	41.67	0.20	1700	24	4	288	150
10	0.85	240	41.67	0.30	2550	24	4	288	105
10	0.85	240	41.67	0.40	3400	24	4	288	82
10	0.85	240	41.67	0.50	4250	24	4	288	70
10	0.85	240	41.67	0.60	5100	24	4	288	57
10	0.85	240	41.67	0.70	5950	24	4	288	50
10	0.85	240	41.67	0.80	6800	24	4	288	44
10	0.85	240	41.67	0.90	7650	24	4	288	40
10	0.85	240	41.67	1.00	8500	24	4	288	35
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
10	0.85	240	41.67	0.10	850	24	7	288	300
10	0.85	240	41.67	0.20	1700	24	7	288	300
10	0.85	240	41.67	0.30	2550	24	7	288	180
10	0.85	240	41.67	0.40	3400	24	7	288	135
10	0.85	240	41.67	0.50	4250	24	7	288	112
10	0.85	240	41.67	0.60	5100	24	7	288	98
10	0.85	240	41.67	0.70	5950	24	7	288	86
10	0.85	240	41.67	0.80	6800	24	7	288	72
10	0.85	240	41.67	0.90	7650	24	7	288	65
10	0.85	240	41.67	1.00	8500	24	7	288	60

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14kVA – UH3G2L140C61T / H3BG2L140C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.7	240	58.33	0.10	980	24	2	288	135
14	0.7	240	58.33	0.20	1960	24	2	288	72
14	0.7	240	58.33	0.30	2940	24	2	288	50
14	0.7	240	58.33	0.40	3920	24	2	288	38
14	0.7	240	58.33	0.50	4900	24	2	288	28
14	0.7	240	58.33	0.60	5880	24	2	288	21
14	0.7	240	58.33	0.70	6860	24	2	288	17
14	0.7	240	58.33	0.80	7840	24	2	288	15
14	0.7	240	58.33	0.90	8820	24	2	288	12
14	0.7	240	58.33	1.00	9800	24	2	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.7	240	58.33	0.10	980	24	5	288	300
14	0.7	240	58.33	0.20	1960	24	5	288	165
14	0.7	240	58.33	0.30	2940	24	5	288	120
14	0.7	240	58.33	0.40	3920	24	5	288	90
14	0.7	240	58.33	0.50	4900	24	5	288	82
14	0.7	240	58.33	0.60	5880	24	5	288	63
14	0.7	240	58.33	0.70	6860	24	5	288	55
14	0.7	240	58.33	0.80	7840	24	5	288	48
14	0.7	240	58.33	0.90	8820	24	5	288	43
14	0.7	240	58.33	1.00	9800	24	5	288	38
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.7	240	58.33	0.10	980	24	8	288	300
14	0.7	240	58.33	0.20	1960	24	8	288	300
14	0.7	240	58.33	0.30	2940	24	8	288	180
14	0.7	240	58.33	0.40	3920	24	8	288	135
14	0.7	240	58.33	0.50	4900	24	8	288	112
14	0.7	240	58.33	0.60	5880	24	8	288	98
14	0.7	240	58.33	0.70	6860	24	8	288	86
14	0.7	240	58.33	0.80	7840	24	8	288	78
14	0.7	240	58.33	0.90	8820	24	8	288	65
14	0.7	240	58.33	1.00	9800	24	8	288	60

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.85	240	58.33	0.10	1190	24	2	288	112
14	0.85	240	58.33	0.20	2380	24	2	288	60
14	0.85	240	58.33	0.30	3570	24	2	288	43
14	0.85	240	58.33	0.40	4760	24	2	288	29
14	0.85	240	58.33	0.50	5950	24	2	288	21
14	0.85	240	58.33	0.60	7140	24	2	288	16
14	0.85	240	58.33	0.70	8330	24	2	288	13
14	0.85	240	58.33	0.80	9520	24	2	288	11
14	0.85	240	58.33	0.90	10710	24	2	288	10
14	0.85	240	58.33	1.00	11900	24	2	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.85	240	58.33	0.10	1190	24	5	288	300
14	0.85	240	58.33	0.20	2380	24	5	288	150
14	0.85	240	58.33	0.30	3570	24	5	288	98
14	0.85	240	58.33	0.40	4760	24	5	288	78
14	0.85	240	58.33	0.50	5950	24	5	288	63
14	0.85	240	58.33	0.60	7140	24	5	288	53
14	0.85	240	58.33	0.70	8330	24	5	288	45
14	0.85	240	58.33	0.80	9520	24	5	288	40
14	0.85	240	58.33	0.90	10710	24	5	288	35
14	0.85	240	58.33	1.00	11900	24	5	288	30
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
14	0.85	240	58.33	0.10	1190	24	8	288	300
14	0.85	240	58.33	0.20	2380	24	8	288	240
14	0.85	240	58.33	0.30	3570	24	8	288	150
14	0.85	240	58.33	0.40	4760	24	8	288	120
14	0.85	240	58.33	0.50	5950	24	8	288	98
14	0.85	240	58.33	0.60	7140	24	8	288	82
14	0.85	240	58.33	0.70	8330	24	8	288	72
14	0.85	240	58.33	0.80	9520	24	8	288	63
14	0.85	240	58.33	0.90	10710	24	8	288	55
14	0.85	240	58.33	1.00	11900	24	8	288	51

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18kVA – UH3G2L180C61T / H3BG2L180C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.7	240	75.00	0.10	1260	24	2	288	105
18	0.7	240	75.00	0.20	2520	24	2	288	57
18	0.7	240	75.00	0.30	3780	24	2	288	40
18	0.7	240	75.00	0.40	5040	24	2	288	27
18	0.7	240	75.00	0.50	6300	24	2	288	20
18	0.7	240	75.00	0.60	7560	24	2	288	16
18	0.7	240	75.00	0.70	8820	24	2	288	12
18	0.7	240	75.00	0.80	10080	24	2	288	10
18	0.7	240	75.00	0.90	11340	24	2	288	9
18	0.7	240	75.00	1.00	12600	24	2	288	7
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.7	240	75.00	0.10	1260	24	5	288	300
18	0.7	240	75.00	0.20	2520	24	5	288	135
18	0.7	240	75.00	0.30	3780	24	5	288	98
18	0.7	240	75.00	0.40	5040	24	5	288	72
18	0.7	240	75.00	0.50	6300	24	5	288	60
18	0.7	240	75.00	0.60	7560	24	5	288	50
18	0.7	240	75.00	0.70	8820	24	5	288	44
18	0.7	240	75.00	0.80	10080	24	5	288	37
18	0.7	240	75.00	0.90	11340	24	5	288	32
18	0.7	240	75.00	1.00	12600	24	5	288	27
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.7	240	75.00	0.10	1260	24	8	288	300
18	0.7	240	75.00	0.20	2520	24	8	288	180
18	0.7	240	75.00	0.30	3780	24	8	288	150
18	0.7	240	75.00	0.40	5040	24	8	288	112
18	0.7	240	75.00	0.50	6300	24	8	288	90
18	0.7	240	75.00	0.60	7560	24	8	288	78
18	0.7	240	75.00	0.70	8820	24	8	288	70
18	0.7	240	75.00	0.80	10080	24	8	288	60
18	0.7	240	75.00	0.90	11340	24	8	288	53
18	0.7	240	75.00	1.00	12600	24	8	288	48

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.85	240	75.00	0.10	1530	24	2	288	90
18	0.85	240	75.00	0.20	3060	24	2	288	48
18	0.85	240	75.00	0.30	4590	24	2	288	31
18	0.85	240	75.00	0.40	6120	24	2	288	21
18	0.85	240	75.00	0.50	7650	24	2	288	16
18	0.85	240	75.00	0.60	9180	24	2	288	12
18	0.85	240	75.00	0.70	10710	24	2	288	10
18	0.85	240	75.00	0.80	12240	24	2	288	9
18	0.85	240	75.00	0.90	13770	24	2	288	7
18	0.85	240	75.00	1.00	15300	24	2	288	5
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.85	240	75.00	0.10	1530	24	5	288	240
18	0.85	240	75.00	0.20	3060	24	5	288	112
18	0.85	240	75.00	0.30	4590	24	5	288	82
18	0.85	240	75.00	0.40	6120	24	5	288	60
18	0.85	240	75.00	0.50	7650	24	5	288	50
18	0.85	240	75.00	0.60	9180	24	5	288	42
18	0.85	240	75.00	0.70	10710	24	5	288	35
18	0.85	240	75.00	0.80	12240	24	5	288	28
18	0.85	240	75.00	0.90	13770	24	5	288	24
18	0.85	240	75.00	1.00	15300	24	5	288	21
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
18	0.85	240	75.00	0.10	1530	24	8	288	300
18	0.85	240	75.00	0.20	3060	24	8	288	165
18	0.85	240	75.00	0.30	4590	24	8	288	120
18	0.85	240	75.00	0.40	6120	24	8	288	90
18	0.85	240	75.00	0.50	7650	24	8	288	78
18	0.85	240	75.00	0.60	9180	24	8	288	65
18	0.85	240	75.00	0.70	10710	24	8	288	55
18	0.85	240	75.00	0.80	12240	24	8	288	50
18	0.85	240	75.00	0.90	13770	24	8	288	45
18	0.85	240	75.00	1.00	15300	24	8	288	40

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22kVA – UH3G2L220C61T / H3BG2L220C61T

(Runtimes are approximate)

UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.7	240	91.67	0.10	1540	24	2	288	90
22	0.7	240	91.67	0.20	3080	24	2	288	48
22	0.7	240	91.67	0.30	4620	24	2	288	30
22	0.7	240	91.67	0.40	6160	24	2	288	21
22	0.7	240	91.67	0.50	7700	24	2	288	16
22	0.7	240	91.67	0.60	9240	24	2	288	12
22	0.7	240	91.67	0.70	10780	24	2	288	10
22	0.7	240	91.67	0.80	12320	24	2	288	8
22	0.7	240	91.67	0.90	13860	24	2	288	7
22	0.7	240	91.67	1.00	15400	24	2	288	5
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.7	240	91.67	0.10	1540	24	5	288	240
22	0.7	240	91.67	0.20	3080	24	5	288	112
22	0.7	240	91.67	0.30	4620	24	5	288	82
22	0.7	240	91.67	0.40	6160	24	5	288	60
22	0.7	240	91.67	0.50	7700	24	5	288	50
22	0.7	240	91.67	0.60	9240	24	5	288	42
22	0.7	240	91.67	0.70	10780	24	5	288	35
22	0.7	240	91.67	0.80	12320	24	5	288	28
22	0.7	240	91.67	0.90	13860	24	5	288	24
22	0.7	240	91.67	1.00	15400	24	5	288	21
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 MATCHING BATTERY CABINETS @ .70pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.7	240	91.67	0.10	1540	24	8	288	300
22	0.7	240	91.67	0.20	3080	24	8	288	165
22	0.7	240	91.67	0.30	4620	24	8	288	120
22	0.7	240	91.67	0.40	6160	24	8	288	90
22	0.7	240	91.67	0.50	7700	24	8	288	78
22	0.7	240	91.67	0.60	9240	24	8	288	65
22	0.7	240	91.67	0.70	10780	24	8	288	55
22	0.7	240	91.67	0.80	12320	24	8	288	50
22	0.7	240	91.67	0.90	13860	24	8	288	44
22	0.7	240	91.67	1.00	15400	24	8	288	40

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UPS ESTIMATED RUNTIME WITH ONLY INTERNAL BATTERIES @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.85	240	91.67	0.10	1870	24	2	288	78
22	0.85	240	91.67	0.20	3740	24	2	288	40
22	0.85	240	91.67	0.30	5610	24	2	288	23
22	0.85	240	91.67	0.40	7480	24	2	288	16
22	0.85	240	91.67	0.50	9350	24	2	288	11
22	0.85	240	91.67	0.60	11220	24	2	288	9
22	0.85	240	91.67	0.70	13090	24	2	288	7
22	0.85	240	91.67	0.80	14960	24	2	288	6
22	0.85	240	91.67	0.90	16830	24	2	288	4
22	0.85	240	91.67	1.00	18700	24	2	288	3
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 1 MATCHING BATTERY CABINET @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.85	240	91.67	0.10	1870	24	5	288	165
22	0.85	240	91.67	0.20	3740	24	5	288	98
22	0.85	240	91.67	0.30	5610	24	5	288	65
22	0.85	240	91.67	0.40	7480	24	5	288	51
22	0.85	240	91.67	0.50	9350	24	5	288	42
22	0.85	240	91.67	0.60	11220	24	5	288	32
22	0.85	240	91.67	0.70	13090	24	5	288	26
22	0.85	240	91.67	0.80	14960	24	5	288	21
22	0.85	240	91.67	0.90	16830	24	5	288	18
22	0.85	240	91.67	1.00	18700	24	5	288	16
UPS ESTIMATED RUNTIME WITH INTERNAL BATTERIES AND 2 BATTERY MATCHING CABINETS @ .85pf									
Rating	PF	Output Voltage	Rated I	Rated Load %	Output Watts	# Batt	# Strings	Nominal	Runtime
22	0.85	240	91.67	0.10	1870	24	8	288	300
22	0.85	240	91.67	0.20	3740	24	8	288	150
22	0.85	240	91.67	0.30	5610	24	8	288	105
22	0.85	240	91.67	0.40	7480	24	8	288	82
22	0.85	240	91.67	0.50	9350	24	8	288	63
22	0.85	240	91.67	0.60	11220	24	8	288	53
22	0.85	240	91.67	0.70	13090	24	8	288	46
22	0.85	240	91.67	0.80	14960	24	8	288	42
22	0.85	240	91.67	0.90	16830	24	8	288	36
22	0.85	240	91.67	1.00	18700	24	8	288	30

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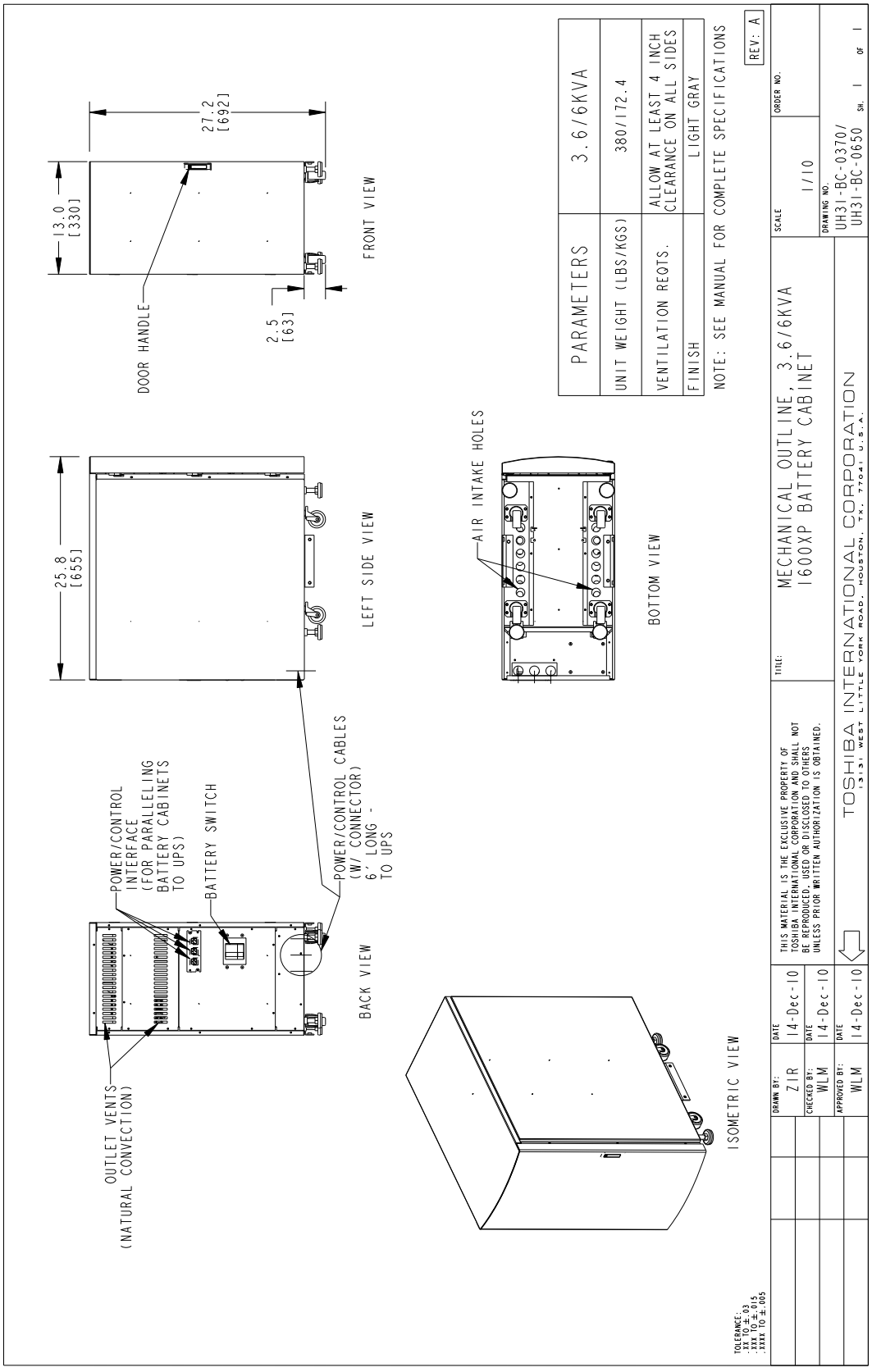
Appendix E: External Battery Cabinets (Matching) - Outlines


27.2 [692]
13.0 [330]
DOOR HANDLE
2.5 [63]
FRONT VIEW
PARAMETERS
3.6/6KVA
UNIT WEIGHT (LBS/KGS)
380/172.4
VENTILATION REQTS.
ALLOW AT LEAST 4 INCH CLEARANCE ON ALL SIDES
FINISH
LIGHT GRAY
NOTE: SEE MANUAL FOR COMPLETE SPECIFICATIONS
REV: A
25.8 [655]
LEFT SIDE VIEW
AIR INTAKE HOLES
BOTTOM VIEW
POWER/CONTROL INTERFACE (FOR PARALLELING BATTERY CABINETS TO UPS)
BATTERY SWITCH
POWER/CONTROL CABLES (W/ CONNECTOR) 6' LONG - TO UPS
OUTLET VENTS (NATURAL CONVECTION)
BACK VIEW
ISOMETRIC VIEW
TOLERANCE:
.XX TO ± .03
.XXX TO ± .015
.XXXX TO ± .005
DRAWN BY: ZIR DATE 14-Dec-10
CHECKED BY: WLM DATE 14-Dec-10
APPROVED BY: WLM DATE 14-Dec-10
THIS MATERIAL IS THE EXCLUSIVE PROPERTY OF TOSHIBA INTERNATIONAL CORPORATION AND SHALL NOT BE REPRODUCED, USED OR DISCLOSED TO OTHERS UNLESS PRIOR WRITTEN AUTHORIZATION IS OBTAINED.
TITLE: MECHANICAL OUTLINE, 3.6/6KVA 1600XP BATTERY CABINET
SCALE 1/10
DRAWING NO. UH31-BC-0370/ UH31-BC-0650
ORDER NO.
SH. 1 OF 1
TOSHIBA INTERNATIONAL CORPORATION
13131 WEST LITTLE YORK ROAD, HOUSTON, TX. 77041 U.S.A.

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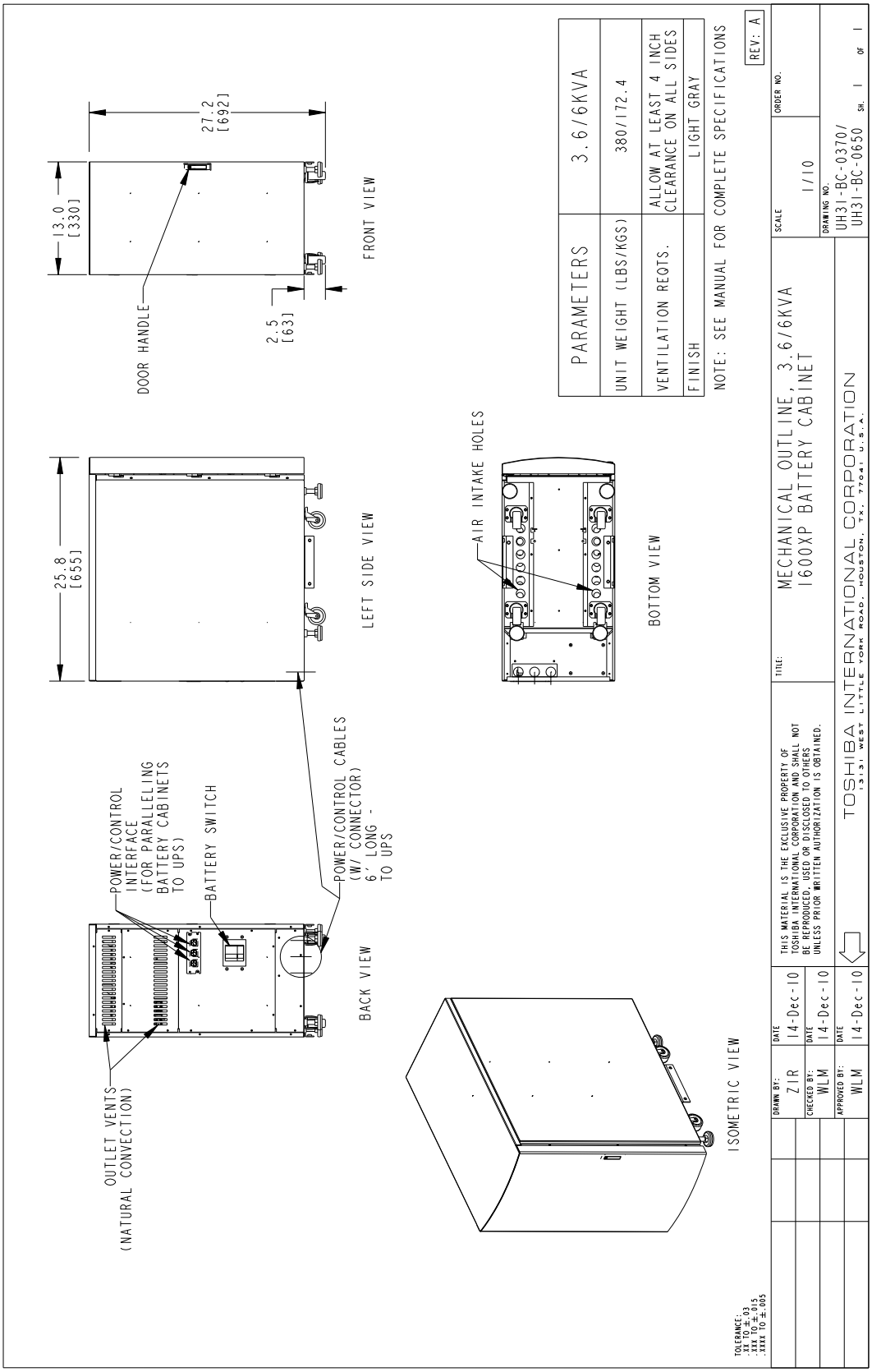

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Appendix F: External Battery Cabinets (Non-Matching)

F.1 Estimated Runtime

Non-matching battery cabinets are available in a variety of sizes to match your back-up needs. Table F-1 lists the estimated backup time for each UPS model battery cabinet selections available for each 1600XP/1600XPi model.

Each of the battery cabinets listed below comes with:

- 12 foot long DC power cables with UPS-specific keyed Anderson plugs.
- 10 foot long A/C Battery Charging cables requiring a 120V, L6-R30 wall receptacle.

TABLE F-1 - ESTIMATED BACKUP TIMES AT RATED LOAD FOR ONE (1) NON-MATCHING BATTERY CABINET

kVA	P/N	Est. Run Time *	Battery Cabinets		BC Breaker	Est. Recharge time (Hrs.)	Total Wt. (lbs)
			Quan	Style			
3.6	UH3-BC-036150	150	1	25T	40A	10.5	1160
	UH3-BC-036210	210	1	25T	40A	14.7	1400
	UH3-BC-036270	270	1	25T	40A	19.1	1775
6	UE3-BC-060120	120	1	25T	40A	13.1	1520
	UE3-BC-060240	240	1	39T	50A	25.1	2523
8	UE3-BC-080120	120	1	25T	40A	13.1	1880
	UE3-BC-080240	240	1	39T	50A	25.1	3183
10	UE3-BC-100120	120	1	25T	50A	14.0	2360
	UE3-BC-100180	180	1	39T	60A	24.4	3183
	UE3-BC-100240	240	2	25T	60A	33.3	4288
14	UE3-BC-140120	120	1	39T	60A	19.1	3183
	UE3-BC-140180	180	2	25T	60A	33.5	4720
	UE3-BC-140270	270	2	39T	60A	46.8	6366
18	UE3-BC-180060	60	1	25T	80A	12.4	2360
	UE3-BC-180120	120	2	25T	80A	29.8	4288
	UE3-BC-180210	210	2	39T	80A	46.1	6366
	UE3-BC-180360	360	3	39T	40A	75.9	9549
22	UE3-BC-220060	60	1	39T	100A	17.6	3168
	UE3-BC-220090	90	2	25T	100A	29.1	4318
	UE3-BC-220180	180	3	25T	50A	47.7	7080
	UE3-BC-220240	240	3	39T	50A	68.8	9549

* Runtime will vary due to differences in battery manufacture, age, temperature, load, life-cycle, and utilization profile.

Notes:

- Additional runtime can be achieved by adding additional battery cabinets. Contact your Toshiba representative for details.
- Estimated runtime and SOC on LCD will be not accurate with non-matching type battery cabinet,

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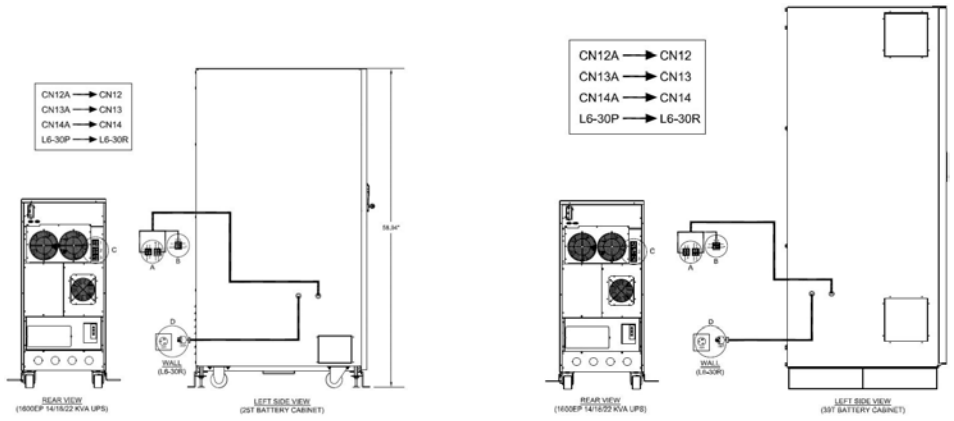
F.2 Battery Cabinet Outlines

TABLE F-2 - NON-MATCHING BATTERY CABINET DIMENSIONS

Battery Cabinet	Width	Depth	Height
25T	29 in.	31.5 in	59 in.
39T	36 in.	29.5 in.	70.7 in.



25T 39T

Figure F.1 - Relative Sizes of External Non-matching Battery Cabinets

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